AD_____

Award Number: DAMD17-88-D-1000

TITLE: The Evaluation of Thermal Disciplines to Minimize Casualties for Operations in Southwest Asia

PRINCIPAL INVESTIGATOR: Donna Bareis, Ph.D.

CONTRACTING ORGANIZATION: Science Applications
                            International Corporation
                            McLean, Virginia 22102

REPORT DATE: April 1991

TYPE OF REPORT: Final

PREPARED FOR: U.S. Army Medical Research and Materiel Command
                Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: Approved for Public Release;
                        Distribution Unlimited

The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision unless so designated by other documentation.

20010724 052

REPORT DOCUMENTATION PAGE

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE April 1991	3. REPORT TYPE AND DATES COVERED Final	

4. TITLE AND SUBTITLE
The Evaluation of Thermal Disciplines to Minimize Casualties for Operations in Southwest Asia

5. FUNDING NUMBERS
DAMD17-88-D-1000

6. AUTHOR(S)
Donna Bareis, Ph.D.

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Science Applications International, Corporation
McLean, Virginia 22102
E-Mail:

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release; Distribution Unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 Words)*

14. SUBJECT TERMS

15. NUMBER OF PAGES
179

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT Unlimited

The Evaluation of Thermal Disciplines
to Minimize Casualties for
Operations in Southwest Asia

Prepared by

Maureen M. Stark
Richard E. McNally
Douglas E. Lee
Alice M. Machovec

Science Applications International Corporation
626 Towne Center Drive
Suite 205
Joppa, MD 21085

Table of Contents

1

List of Tables

List of Figures

3

THE EVALUATION OF THERMAL DISCIPLINES TO MINIMIZE CASUALTIES FOR OPERATIONS IN SOUTHWEST ASIA

1.   INTRODUCTION

For many years, the U.S. Army has been concerned with how to conduct military operations in the various climates likely to be encountered throughout the world. Of greatest concern are the areas of the globe with extreme thermal environments, such as those found in Southwest Asia. The severe weather found in this area imposes a tremendous burden on the soldier, making it difficult, if not impossible, to accomplish the military missions required in combat. Heat stress becomes a real threat to a unit's ability to survive.

Current doctrine, as provided in U.S. Army Field Manual 21-10, outlines measures designed to minimize heat stress casualties, such as acclimatizing personnel to high temperatures as gradually as possible, encouraging soldiers to drink up to 4 gallons per day, and implementing work/rest cycles when the mission permits. Work/Rest ratios are determined as a function of the existing heat conditions. The practicality of implementing these work/rest cycles in the field is questionable as it is difficult to foresee stopping in the midst of a firefight to rest. The consequences of not stopping to rest, however, may be equally severe.

Extreme thermal conditions are magnified on the combined effects battlefield. While chemical protective gear (Mission-Oriented Protective Posture - MOPP) is designed to protect the soldier from the effects of chemical munitions, it is extremely hot to wear and adds significantly to the likelihood of heat stress. While soldiers may avoid becoming a chemical casualty, under certain conditions they may find it impossible to avoid becoming a heat stress casualty.

The current "Desert Shield" operation makes it imperative to evaluate the current work/rest doctrine. Critical questions that need to be addressed are: Does the current doctrine really minimize casualties to an acceptable level? Does the current doctrine allow for less than fully acclimatized and fully hydrated troops? Are work/rest cycles the best way to optimize the trade-off of casualties versus unit availability? Can a different work discipline be developed which would provide minimal casualties with a greater return on unit availability?

2. PURPOSE OF STUDY

The purpose of this study is to identify the advantages and risks associated with implementing different thermal work disciplines in a hot environment, such as that found in Southwest Asia.

3. STUDY APPROACH

In conducting this study, the Goldman-Givoni model was used to compare the different work disciplines considered. The Goldman-Givoni model, as implemented at Science Applications International Corporation (SAIC), predicts core temperature given specified set of meteorological conditions, work intensity, clothing worn, and level of acclimatization and dehydration. This core temperature is then used to estimate the resulting probability of casualty for a soldier in this environment. The probability of casualty, along with an estimate of availability for each work discipline, was then used to determine unit productivity.

4. THE GOLDMAN-GIVONI MODEL

The Goldman-Givoni model is based on equations generated by work conducted at the U.S. Army Research Institute of Environmental Medicine (USARIEM) during the late 1960s and early 1970s by Baruch Givoni and Ralph Goldman. Currently, there are at least three implementations of this model being used for different purposes in different organizations. The implementation used for this study was that originally coded by Dr. Klopcic at the U.S. Army Ballistic Research Laboratory for use in the combat simulation model known as AURA (Army Unit Resiliency Analysis) and subsequently modified by analysts at Science Applications International Corporation.[1,2]

The BRL implementation of the Goldman-Givoni model is written in Fortran 77. The foundation for the BRL implementation was the stand-alone FORTRAN model known as TCORE, described by Berlin, Stroschein, and Goldman, in 1975.[3] Initially, TCORE was used as a member of the AURA family of models to produce coefficients which were used as input values to the AURA model. TCORE has subsequently been modified and is now incorporated directly into the AURA model. This modified code has come to be called the BRL implementation of the Goldman-Givoni model. A verification of the model and a demonstration of its used was completed in April of this year.

6

The Goldman-Givoni model accepts inputs describing the meteorological conditions, working metabolic rate, clothing worn, initial skin temperature, level of acclimatization and level of dehydration being considered. The model then uses these inputs to determine the expected equilibrium core temperature of a soldier and the resulting probability of casualty. The BRL implementation of Goldman-Givoni also produces a distribution of the times at which the casualties are expected to occur.

One of the major differences between the assorted implementations of the Goldman-Givoni model was the relationship between predicted core temperature and the resulting probability of casualty. In the past, BRL had used a linear function where 38.5°C represented 0% probability of becoming a casualty and 40.5°C represented a 100% probability of becoming a casualty. The Military Ergonomics Division at USARIEM uses values provided by the IDF[4] in their Goldman-Givoni implementation. The Heat Research Division at USARIEM has adopted the use of the NIOSH-reported casualty data at different levels of core temperature.

Currently, both the BRL implementation of Goldman-Givoni and the SAIC implementation use a cumulative normal distribution to estimate probability of casualty given an individual's core temperature. The resulting curve is shown in Figure 1 and forms the basis for all the casualty predictions included in this report.

PROBABILITY OF CASUALTY
Based on core temperature

Source of Data

× Israeli Data ——— Goldman-Givoni

----- TCORE linear + NIOSH guidelines

* NIOSH reported most will be casualty
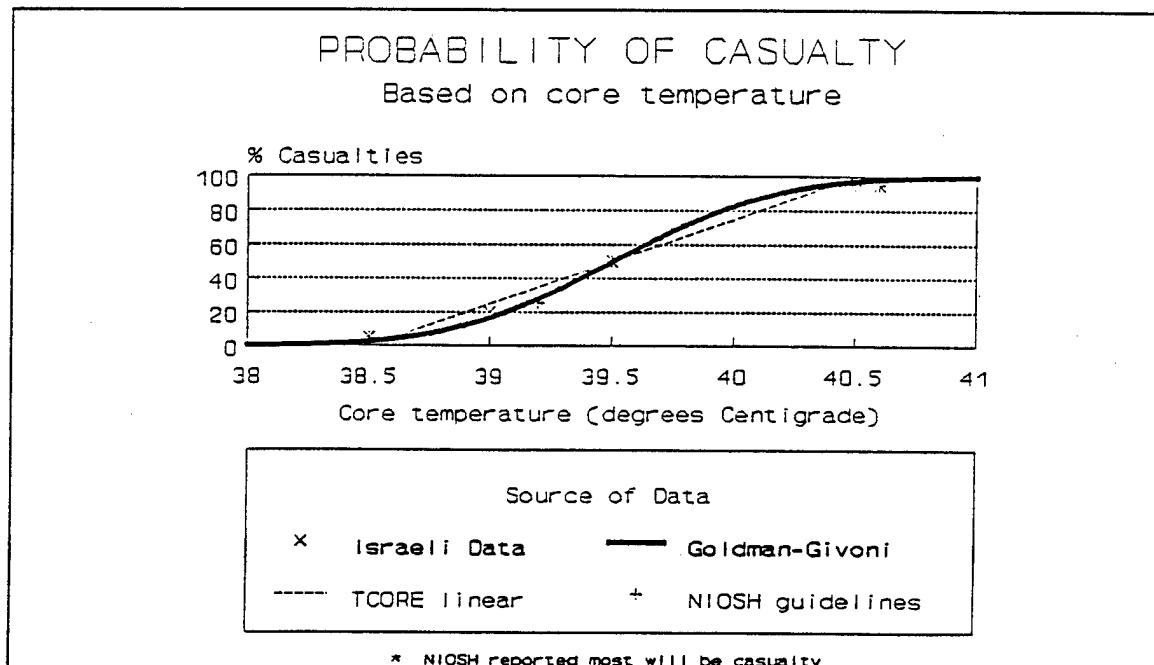
Figure 1. Cumulative Distribution Function of Casualty Probability Based on Core Temperature.

7

In order to examine the different work disciplines of interest, it was necessary to make some changes to the BRL implementation of Goldman-Givoni at SAIC. These modifications did not alter the calculations of equilibrium core temperature as used within the AURA model, but instead enhanced the model to provide a detailed tracking of core temperature over time. The methodology used to estimate core temperature at each time point is discussed in detail in Appendix A. Appendix B contains a listing of the Goldman-Givoni model as used at SAIC. Appendix C provides an example of typical inputs used for the model and some of the resulting outputs.

5. CONDITIONS IN SOUTHWEST ASIA

5.1 METEOROLOGICAL CONDITIONS IN SOUTHWEST ASIA

Meteorological Data collected in Dhahran, Saudi Arabia in July[5] was used for this analysis and is shown in Table 1. As can be expected, conditions change over the course of the day. As such, five time periods are outlined in the table for use in the study, with the most severe conditions prevailing between 1100 and 1500 hours.

Table 1. Average Meteorological Data for Dhahran, Saudi Arabia in July					
LOCAL TIME	WINDSPEED M/S	WET BULB °C	DRY BULB °C	WBGT °C	SOLAR WATTS
0000-0700	2.9	21.5	31.1	24.6	0
0700-1100	4.6	21.5	35.6	27.3	516
1100-1500	6.4	22.6	40.9	29.6	519
1500-1900	6.1	23.0	39.1	28.7	361
1900-2300	3.3	23.1	34.5	26.6	0
2300-2400	2.9	21.5	31.1	24.6	0

5.2 LEVELS OF ACCLIMATIZATION AND DEHYDRATION

In severe weather conditions such as those found in Southwest Asia, it is vital that troops have a chance to acclimatize themselves to the conditions in which they will be expected to operate. Unacclimatized troops find desert operations extremely difficult and likely to produce a high number of heat stress casualties. Given the chance to work in these conditions for at least twelve days, soldiers will have a much better chance of avoiding heat stress than those new to the environment.

In this hot environment, it is also essential that troops maintain a strict regiment of water intake. It is well known that most humans do not drink enough fluids to maintain their bodies at full hydration but, instead, typically maintain a level of 2% dehydration while going about their normal routines. Severe dehydration (around 7%) will likely result in death.

For this study, four levels of acclimatization were examined: 0, 4, 8, and 12 days of acclimatization. In addition, four levels of dehydration were considered: 0, 2, 4 and 6% dehydration.

5.3 CLOTHING

The type of clothing worn by a soldier has a direct effect on his/her core temperature. Three different clothing combinations were evaluated for this study: the standard Battle Dress Uniform (BDU), the Battle Dress Overgarment (BDO) worn over underwear and the Battle Dress Overgarment worn over the standard Battle Dress Uniform (BDO + BDU). These last two clothing combinations represent the type of uniform worn to protect soldiers from chemical attacks. Table 2 lists the clothing parameters used in the analysis[6], along with their wind correction factors.

Table 2. Clothing Parameters Used in AURA Analysis				
Type of Clothing	Clothing Parameters			
	Clo	Gamma	Im/Clo	Gamma
BDU	1.13	0.26	0.43	0.38
BDO	1.68	0.255	0.21	0.49
BDO + BDU	2.00	0.17	0.16	0.25

5.4 WORK DISCIPLINES

In the course of the study, several different work disciplines were examined and compared. These work disciplines included existing doctrine, modifications to this doctrine and a new work discipline. In all, eight work disciplines were evaluated.

In order to provide a baseline for comparison, the first "discipline" considered was no discipline, that is continuous work. Continuous work has the advantage of providing 100% availability but also results in a high level of casualties. Here, availability is used to indicate soldier is not restricted in the amount of time or in the intensity he/she is available to work.

Secondly, the work/rest discipline as outlined in FM 21-10 was evaluated. FM 21-10 specifies water intake and work/rest cycles for the heat conditions expected. As currently implemented, the commander is expected to predict the most severe conditions for the upcoming day and implement the corresponding work/rest cycle throughout the day. Table 3 has been extracted from FM 21-10 and shows the current doctrine for working in hot environments.

For the conditions studied (as shown in Table 1), the commander implementing this discipline in Southwest Asia would order troops to use a 45 minutes work/15 minutes rest cycle throughout the day. Theoretically, this work/rest cycle is sufficient to minimize casualties but provides, at most, 75% availability.

Table 3. Current Doctrine on Work/Rest Cycles as Listed in Field Manual 21-10.

Criteria		PMM[1]	
Heat Condition/ Category	WBGT Index °F	Water Intake Quarts/Hour	Work/Rest Cycle-Minutes
1[2]	78°-81.9°	At least 1/2	Continuous
2	82°-84.9°	At least 1/2	50/10
3	85°-87.9°	At least 1	45/15
4	88°-89.9°	At least 1 1/2	30/30
5[3]	90°& above	More than 2	20/40

[1] Preventive Medicine Measures.
[2] MOPP gear or body armor adds at least 10°F to the WBGT Index.
[3] Suspend physical training and strenuous activity. If operational (non-training) mission requires strenuous activity, enforce water intake to minimize expected heat injuries.

A variant of FM 21-10 was also included in the analysis. This variant used the work/rest cycles outlined in Table 3 but instead of implementing one cycle for the entire day (based on the highest predicted WBGT), the work/rest cycle dictated by the existing meteorological conditions was used. For the conditions expected in Southwest Asia (as shown in Table 1), this resulted in continuous work from 0000 to 1100 hours, 45 minutes work/15 minutes rest from 1100 to 1500 hours, 50 minutes work/10 minutes rest from 1500 to 1900 hours, and continuous work from 1900 to 2400 hours. This work discipline provides a higher level of availability than does the prescribed implementation of FM 21-10. It's ability to minimize casualties, however, was unknown at the start of the analysis.

A new work discipline was also examined. This work discipline allowed soldiers to pace themselves over the course of the day, taking care not to allow their core temperatures to exceed a pre-determined level. This work discipline had the advantage of minimizing casualties and, potentially, maximizing availability. In order to keep core temperature below a specified limit, however, a reduction in work intensity might be required. Here, the crucial question was: Would the lower number of casualties make up for any loss of work intensity? Three different core temperature limits were considered: 38°C, 38.5°C and 39°C. This set of disciplines are referred to as the Metabolic Limit Cases.

Finally, a former Army doctrine for work in hot environments was considered. Field Manual 21-40, now obsolete, detailed work/rest cycles for use in such climates. Though no longer in use, this work discipline provided another set of variables to consider in the search for the best work discipline. As with the FM 21-10 prescribed doctrine, two implementations of FM 21-40 were considered. The first assumes the commander has predicted the most severe conditions for the upcoming day and implemented the prescribed work/rest ratio throughout the entire day. A variant on this doctrine assumes the commander dynamically samples the meteorological conditions during the day, changing the work/rest cycles to match the current conditions. Table 4 shows the work/rest doctrine as established in the obsolete FM 21-40.

Table 4. Cyclic Work/Rest Values (Minutes) with Negligible Heat Casualties, FM 21-40.

MOPP[a] LEVEL	WORK RATE	TEMPERATURE RANGES [d]			
		21°C (70°F)	21°-26°C (70°-79°F)	27°-32°C (80°-89°F)	33°C (90°F)
1	LOW	-----[b.]	-----[b.]	-----[b.]	-----[b.]
	MODERATE	-----[b.]	-----[b.]	60/20	40/50
	HEAVY	-----[b.]	60/15	40/25	30/50
2	LOW	-----[b.]	-----[b.]	-----[b.]	50/50
	MODERATE	-----[b.]	-----[b.]	50/35	30/60
	HEAVY	60/30	45/30	25/30	-----[c.]
3	LOW	-----[b.]	-----[b.]	-----[b.]	60/30
	MODERATE	-----[2.]	60/20	40/35	30/50
	HEAVY	40/20	35/30	-----[c.]	-----[c.]
4	LOW	-----[b.]	-----[b.]	40/30	20/50
	MODERATE	40/20	30/25	20/40	-----[c.]
	HEAVY	20/25	-----[c.]	-----[c.]	-----[c.]

[a.] MOPP levels are based on the protective clothing and equipment worn.
1. Fatigues with protective mask only.
2. Fatigues with protective mask, hood, gloves and body armor.
3. Overgarment over fatigues or fatigues over protective liner.
4. Level 3 with addition of mask, hood, gloves and body armor.

[b.] Under these conditions, any reasonable work/rest periods will suffice to prevent heat casualties.

[c.] Under these conditions, work time will be severely limited and even very short periods of heavy work could result in heat casualties.

[d.] Well trained (acclimated) troops will require shorter and less frequent rest periods than poorly trained troops.

The eight work disciplines examined in this study are listed in Table 5.

Table 5.	Work Disciplines Used In Study.
1	Continuous Work
2	Work/Rest Cycles from FM 21-10
3	Metabolic Limit at 39°C
4	Metabolic Limit at 38.5°C
5	Metabolic Limit at 38°C
6	Work/Rest Cycles from FM 21-40
7	FM 21-10 Variant
8	FM 21-40 Variant

5.5 WORK INTENSITY

The intensity of the work performed has a significant impact on an individual's core temperature. Six levels of work intensity (metabolic rates) were examined: 105, 150, 300, 400, 500 and 600 Watts. 105 Watts is equivalent to the metabolic rate seen when resting.

14

5.6 SUMMARY OF STUDY PARAMETERS

Table 6 lists the significant study parameters used for this analysis.

Table 6. Study Parameters	
Level of Acclimatization (Days)	0 4 8 12
Level of Dehydration (%)	0 2 4 6
Metabolic Rate (Watts)	105 150 300 400 500 600
Clothing Worn	BDU BDO BDO over BDU
Work Disciplines	Continuous Work FM 21-10 Met. Limit at 39°C Met. Limit at 38.5°C Met. Limit at 38°C FM 21-40 FM 21-10 Variant FM 21-40 Variant

6. RESULTS

6.1 BACKGROUND

In the course of this analysis, 2304 input sets and computer runs were completed. The resulting data included core temperature profiles, probability of casualty predictions, availability estimates and productivity approximations. This section of the report will be devoted to presenting a representative sample of this data but a full listing of the data generated can be found in Appendix D.

6.2 CORE TEMPERATURE PREDICTIONS

A major output of the SAIC implementation of the Goldman-
Givonni model is a table listing predicted core temperature as a
function of time. Figures 2 through 5 show the core temperature
profiles for four of the work disciplines considered. The case
shown examined a working metabolic rate of 400 Watts,
unacclimatized troops at 2% dehydration and BDU's. Note, each
graph shows the profile for a six hour period during the day.
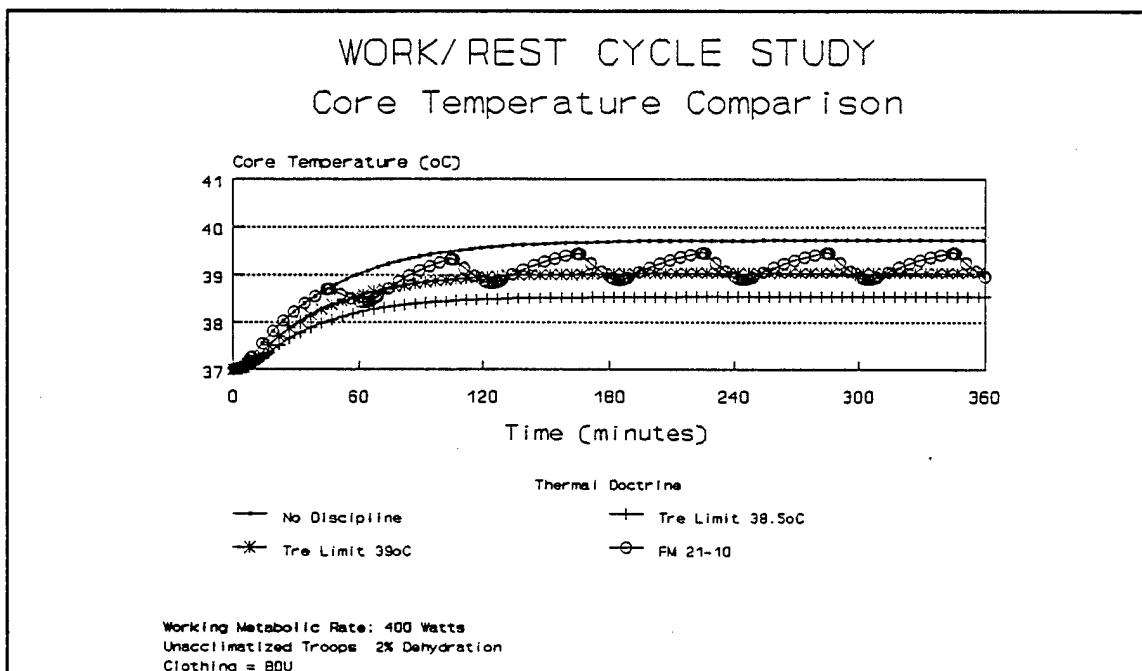
Figure 2. Core Temperature Profile, 400 Watts, Unacclimatized
Troops at 2% Dehydration, BDUs, Part 1.

WORK/REST CYCLE STUDY
Core Temperature Comparison
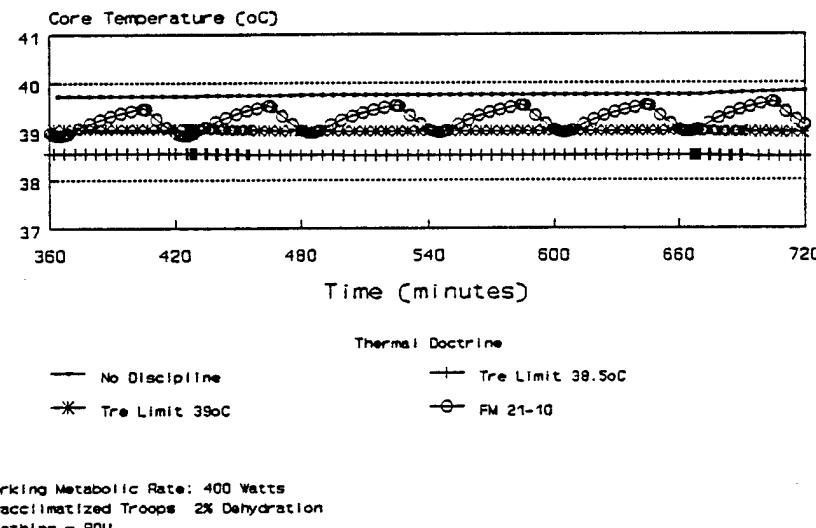
Figure 3. Core Temperature Profile, 400 Watts, Unacclimatized Troops at 2% Dehydration, BDUs, Part 2.

WORK/REST CYCLE STUDY
Core Temperature Comparison
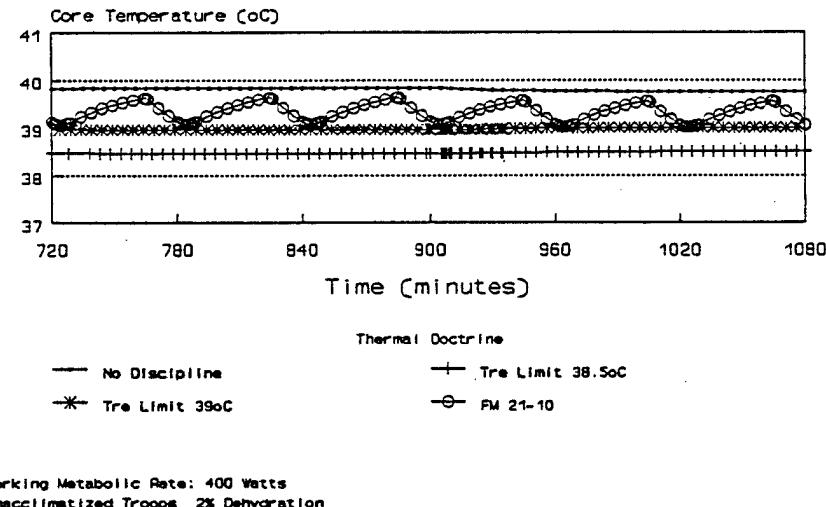
Figure 4. Core Temperature Profile, 400 Watts, Unacclimatized Troops at 2% Dehydration, BDUs, Part 3.

17

WORK/REST CYCLE STUDY
Core Temperature Comparison

Core Temperature (oC)

Time (minutes)

Thermal Doctrine

— No Discipline   —+— Tre Limit 38.5oC
—*— Tre Limit 39oC   —⊖— FM 21-10

Working Metabolic Rate: 400 Watts
Unacclimatized Troops 2% Dehydration
Clothing = BDU
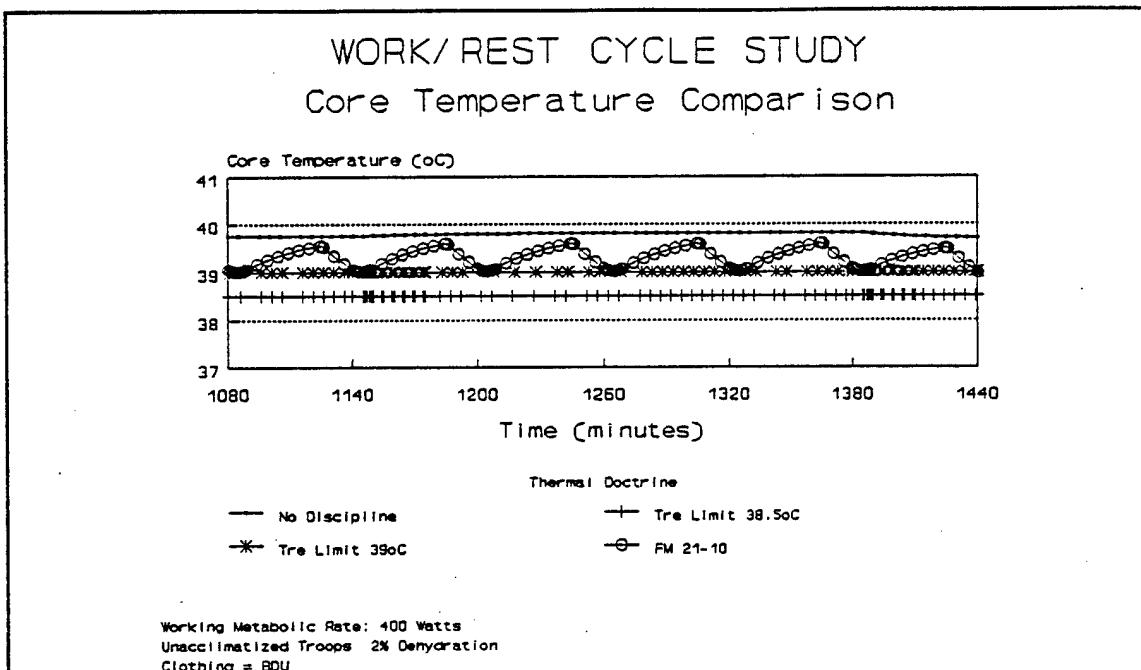
Figure 5. Core Temperature Profile, 400 Watts, Unacclimatized Troops at 2% Dehydration, BDUs, Part 4.

As expected, continuous work (denoted as No Discipline) resulted in the highest core temperature profile seen for these conditions. The work/rest ratios as specified in FM 21-10 produce the desired drop in core temperature during rest periods but come perilously high during work periods. Both metabolic limit cases (denoted as Tre (Rectal Temperature) Limit 38.5°C and 39°C) show the desired result of leveling off at the specified core temperature limit.

Figures 6 through 13 show the same information for fully acclimatized troops at 2% and 6% dehydration, respectively. These graphs suggest the current doctrine on work/rest is not sufficient to keep core temperature, and therefore casualties, within acceptable limits.

WORK/REST CYCLE STUDY

Core Temperature Comparison

Core Temperature (oC)

Time (minutes)

Thermal Doctrine

— No Discipline   —+— Tre Limit 38.5oC
—*— Tre Limit 39oC   —○— FM 21-10

Working Metabolic Rate: 400 Watts
Acclimatized Troops 2% Dehydration
Clothing = BDU
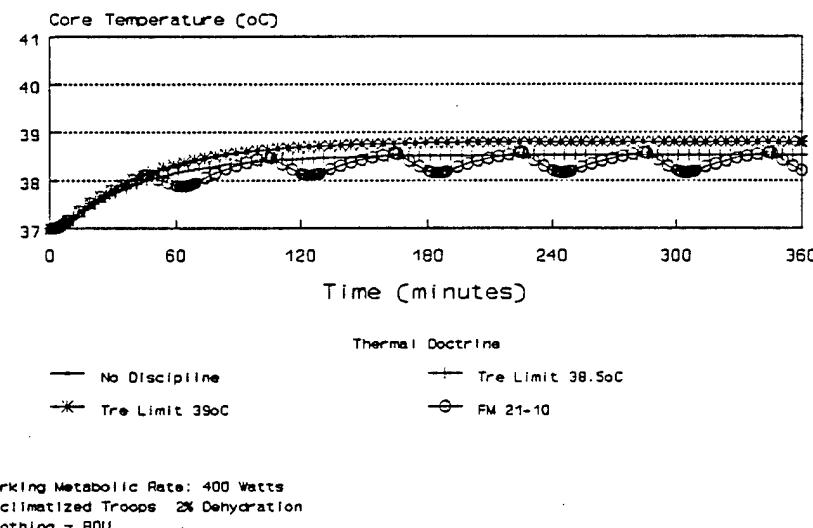
Figure 6. Core Temperature Profile, 400 Watts, Fully Acclimatized Troops at 2% Dehydration, BDUs, Part 1.

WORK/REST CYCLE STUDY

Core Temperature Comparison

Core Temperature (oC)

Time (minutes)

Thermal Doctrine

— No Discipline   —+— Tre Limit 38.5oC
—*— Tre Limit 39oC   —○— FM 21-10

Working Metabolic Rate: 400 Watts
Acclimatized Troops 2% Dehydration
Clothing = BDU
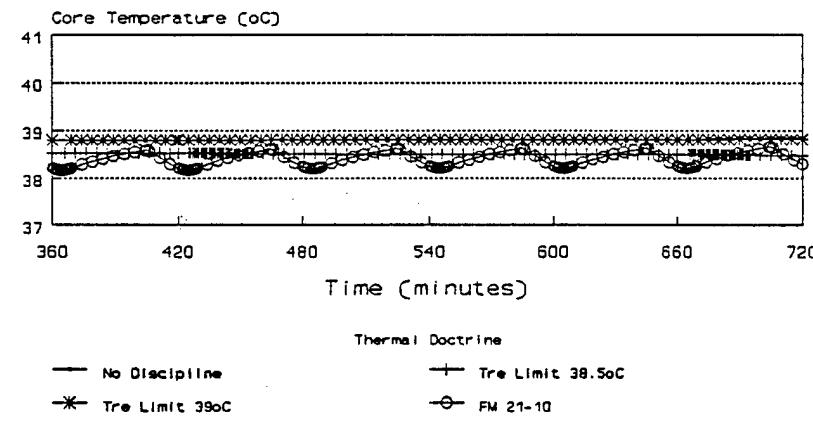
Figure 7. Core Temperature Profile, 400 Watts, Fully Acclimatized Troops, at 2% Dehydration, BDUs, Part 2.

19
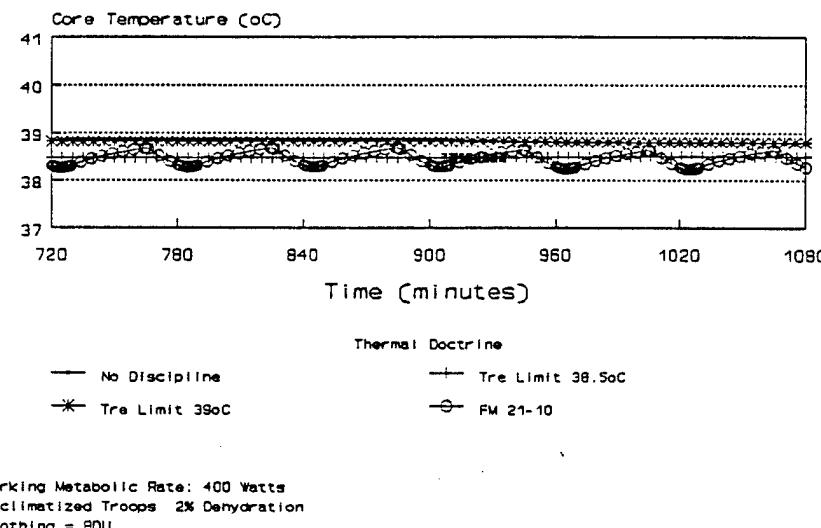
Figure 8. Core Temperature Profile, 400 Watts, Fully Acclimatized Troops at 2% Dehydration, BDUs, Part 3.

Figure 9. Core Temperature Profile, 400 Watts, Fully Acclimatized Troops at 2% Dehydration, BDUs, Part 4.

20
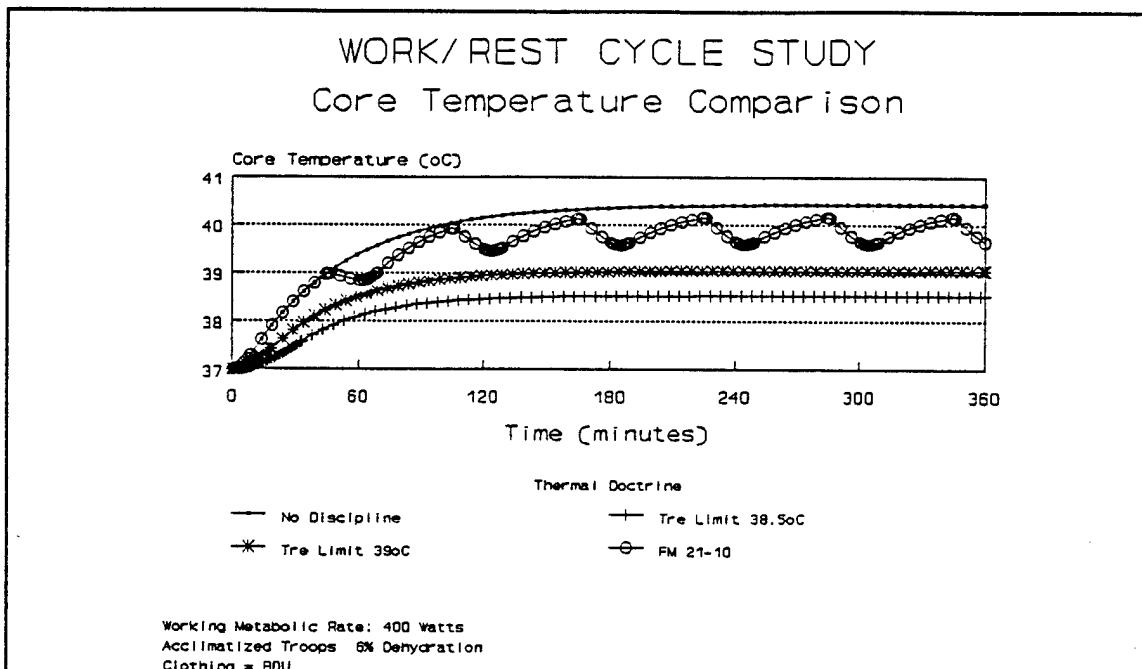
Figure 10. Core Temperature Profile, 400 Watts, Fully Acclimatized Troops at 6% Dehydration, BDUs, Part 1.
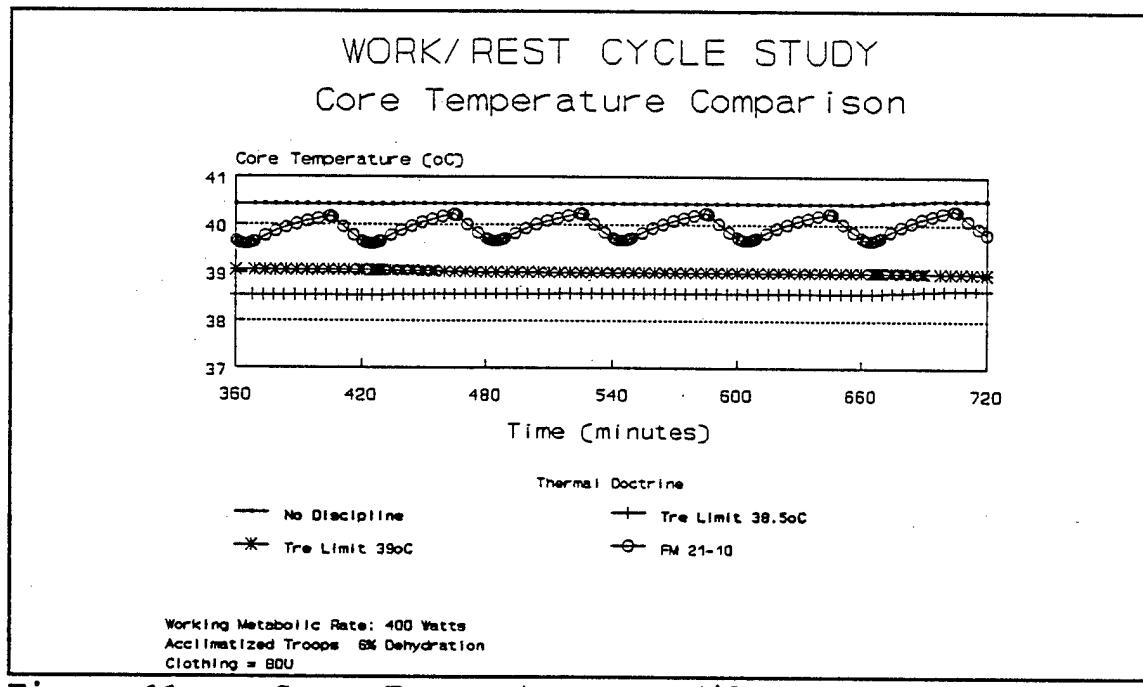
Figure 11. Core Temperature Profile, 400 Watts, Fully Acclimatized Troops at 6% Dehydration, BDUs, Part 2.

WORK/REST CYCLE STUDY
Core Temperature Comparison

Core Temperature (oC)

Time (minutes)

Thermal Doctrine

— No Discipline   —+— Tre Limit 38.5oC
—*— Tre Limit 39oC   —⊖— FM 21-10

Working Metabolic Rate: 400 Watts
Acclimatized Troops 6% Dehydration
Clothing = BDU
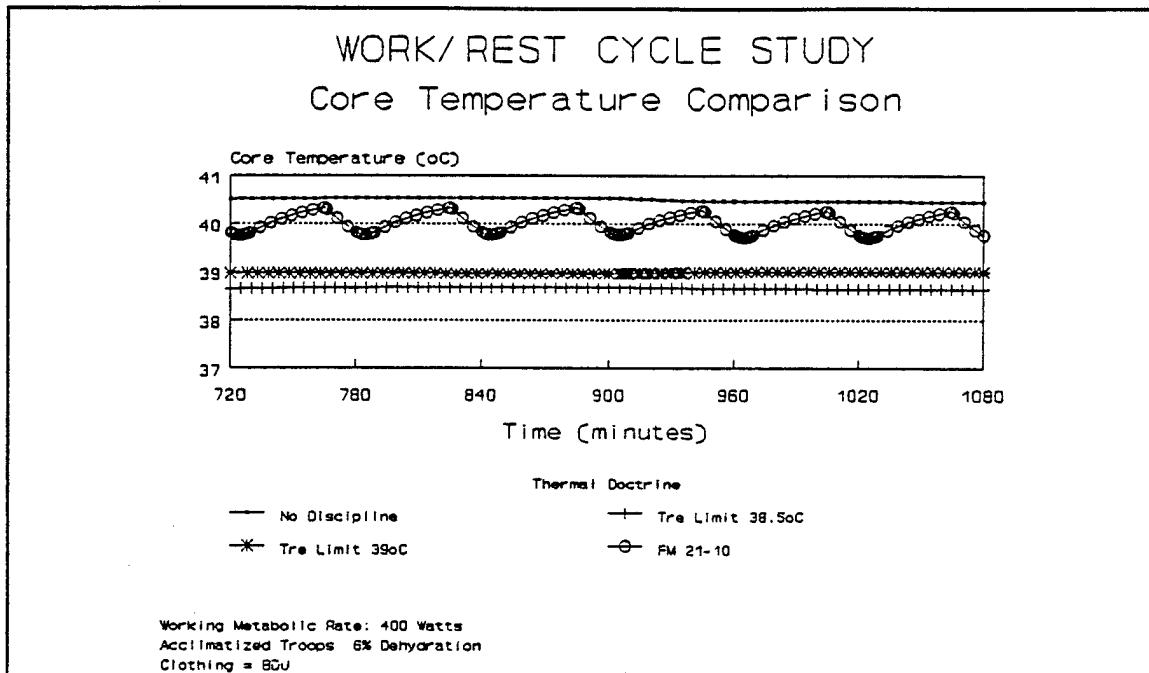
Figure 12.   Core   Temperature   Profile,   400   Watts,   Fully
Acclimatized Troops at 6% Dehydration, BDUs, Part 3.

WORK/REST CYCLE STUDY
Core Temperature Comparison

Core Temperature (oC)

Time (minutes)

Thermal Doctrine

— No Discipline   —+— Tre Limit 38.5oC
—*— Tre Limit 39oC   —⊖— FM 21-10

Working Metabolic Rate: 400 Watts
Acclimatized Troops 6% Dehydration
Clothing = BDU
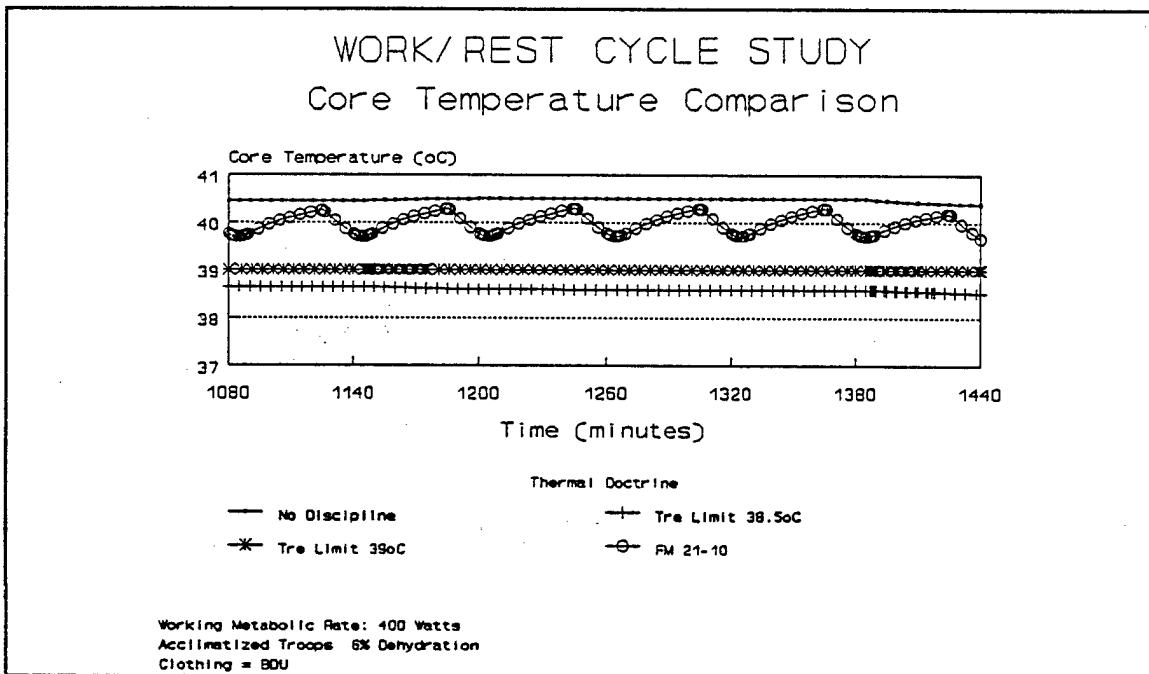
Figure 13.   Core   Temperature   Profile,   400   Watts,   Fully
Acclimatized Troops at 6% Dehydration, BDUs, Part 4.

22

6.3 LEVEL OF CASUALTIES

As explained earlier in this report, the SAIC implementation of the Goldman-Givoni model determines a probability of casualty based on the highest core temperature achieved during the day. Figures 14 through 16 show expected casualties for selected cases implementing FM21-10 work/rest cycles. Three different levels of work intensity are shown (150, 400 and 600 Watts) for the three clothing types considered. Values are given for two levels of acclimatization: fully acclimatized troops or unacclimatized troops.

Notice that at the higher work intensities (400 and 600 Watts), the probability of casualty associated with the wearing of the Battle Dress Overgarment over underwear (BDO4) is lower than it is for those wearing the Battle Dress Uniform (BDU). While this is surprising at first, it turns out to be a result of implementing different work/rest ratios. While in BDUs, troops are directed to work 45 minutes and rest 15 minutes under the existing meteorological conditions. While in chemical protective gear (BDO4 or BDU + BDO4), the prescribed ratio is 20 minutes of work and 40 minutes of rest. Despite the fact that the BDO4 ensemble is more thermally restrictive than BDUs, the change in work/rest ratios resulting in a reduced probability of casualty.
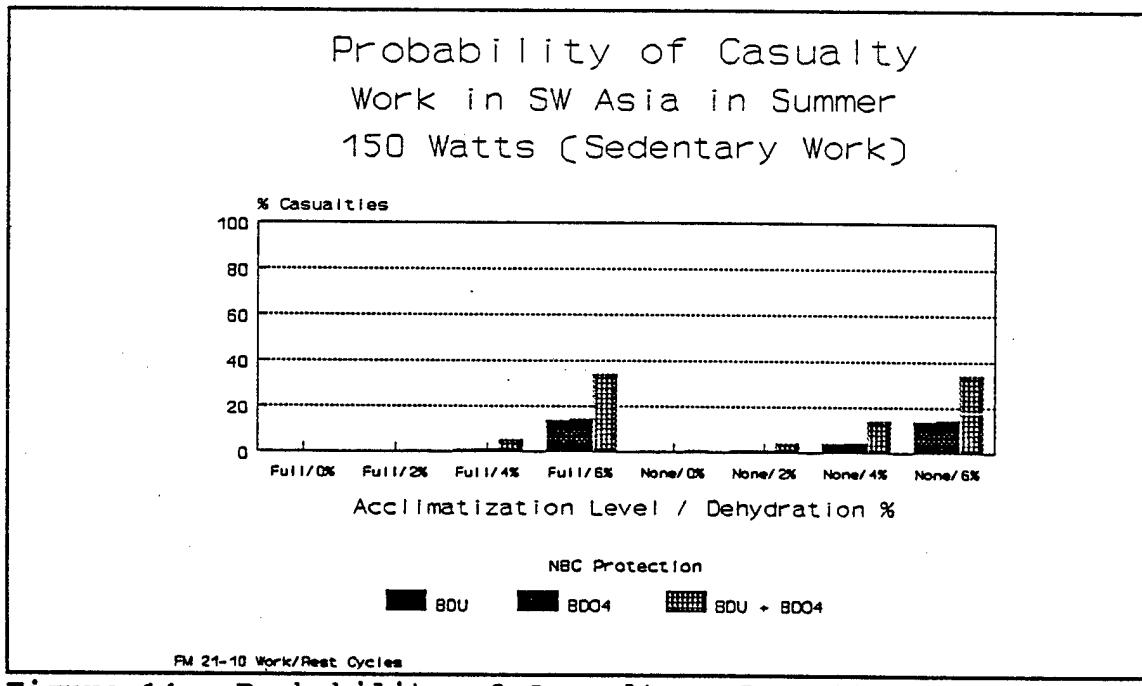
Figure 14. Probability of Casualty, 150 Watts, FM21-10.
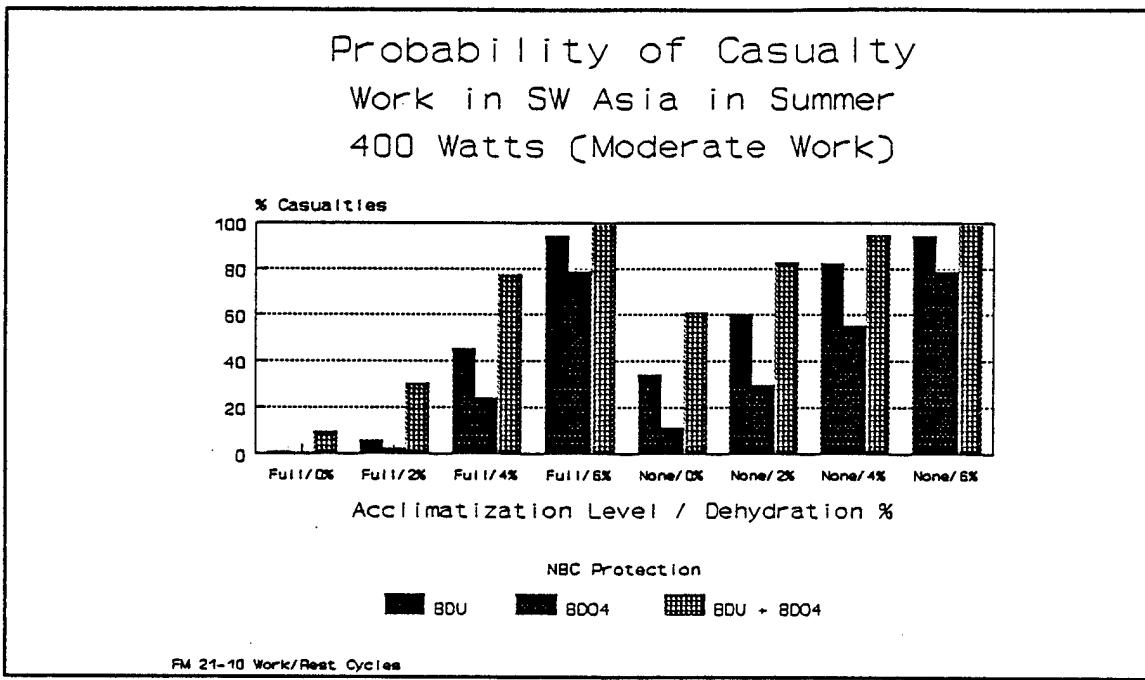
Figure 15. Probability of Casualty, 400 Watts, FM21-10.
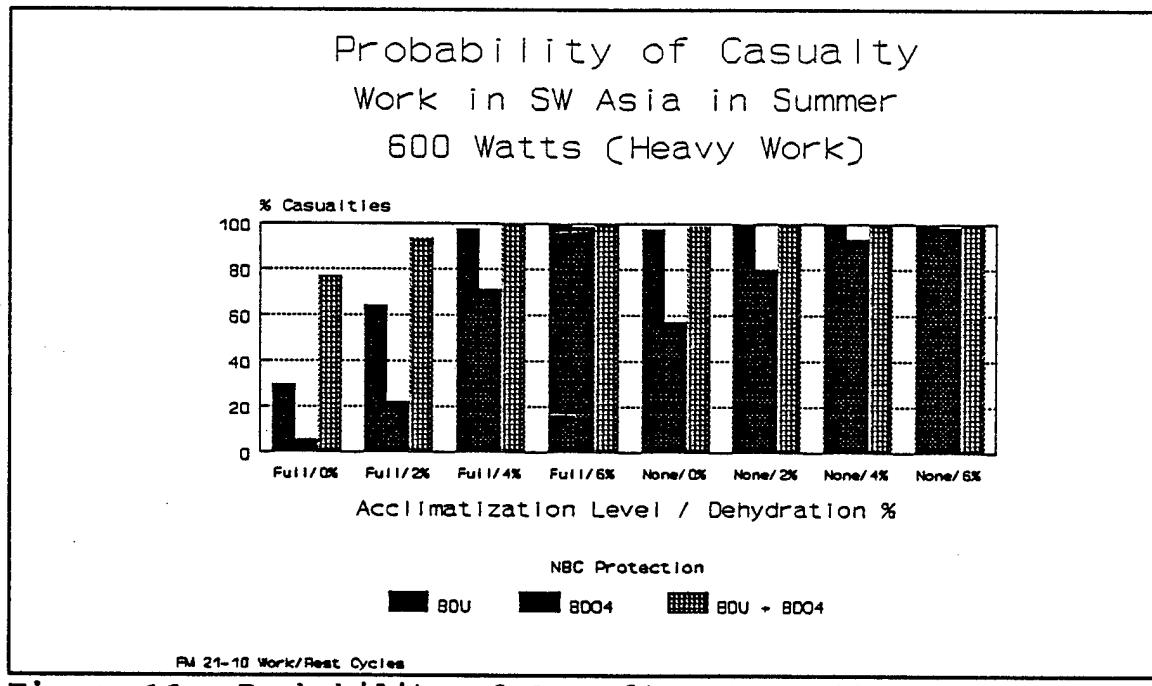
Figure 16. Probability of Casualty, 600 Watts, FM21-10.

6.4 AVAILABILITY VERSUS CASUALTIES

Keeping thermal casualties to a minimum in the field is only one side of the coin. The other is maintaining an acceptable level of availability on the battlefield. While continuous rest will likely avoid all casualties, it certainly does not provide an acceptable level of availability.

The Continuous Work discipline (labeled No W/R) provides 100% availability since there is no superimposed restriction on duty time. This <u>does not</u> suggest that troops will, in fact, be able to work 100% of the time, however. Continuous work can result in a large number of casualties and still show 100% availability. The next section of the results will take both availability and casualties and determine the productivity of the unit, ie. availability X survivors.

Availability for the different work/rest disciplines (FM21-10, FM21-40 and their variants) was determined by using a weighted average of the amount of work time over the total amount of time during the day. For the Metabolic Limit cases, an algorithm was developed to estimate availability:

If

$$MR_{Limited} \geq MR_{Initial} \text{ then } AV = 1$$

Else if

$$MR_{Limited} \leq 105, \text{ then } AV = 0,$$

Else

$$AV = \frac{MR_{Limited} - 105}{MR_{Initial} - 105}.$$

Where,

$MR_{Limited}$ = *Metabolic rate limited by maintaining core temperature at/below specified value.*

$MR_{Initial}$ = *Metabolic rate initially required for job.*

AV = Availability.

105 = Resting metabolic rate.

for each of the required jobs for each time period (ie. set of met conditions) during the day.

Figures 17 through 24 show availability and casualties for each of the eight work disciplines examined under selected conditions. Two graphs were required to show all eight work disciplines. Note that Figures 17 through 22 show results for BDUs while Figures 23 and 24 illustrate the consequences of wearing BDO4.
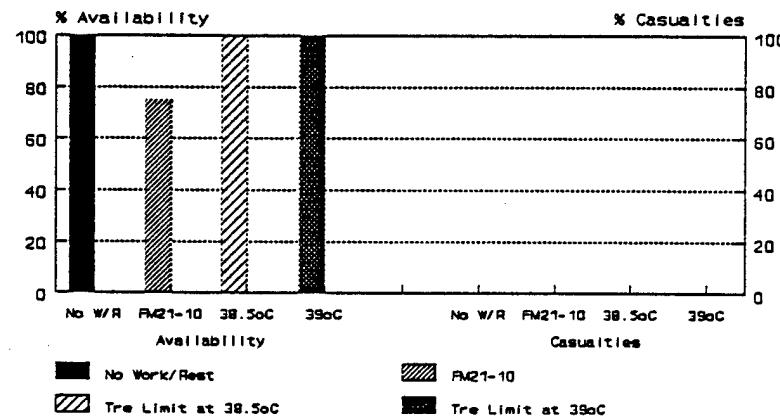
Figure 17. Availability/Casualties, 150 Watts, Fully Acclimatized Troops at 2% Dehydration, BDUs, Part 1.
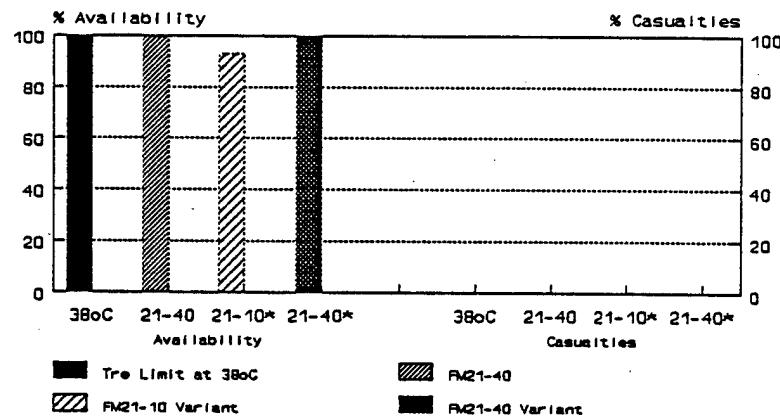
Figure 18. Availability/Casualties, 150 Watts, Fully Acclimatized Troops at 2% Dehydration, BDUs, Part 2.

27

WORK/REST CYCLE STUDY
Southwest Asia Climatology
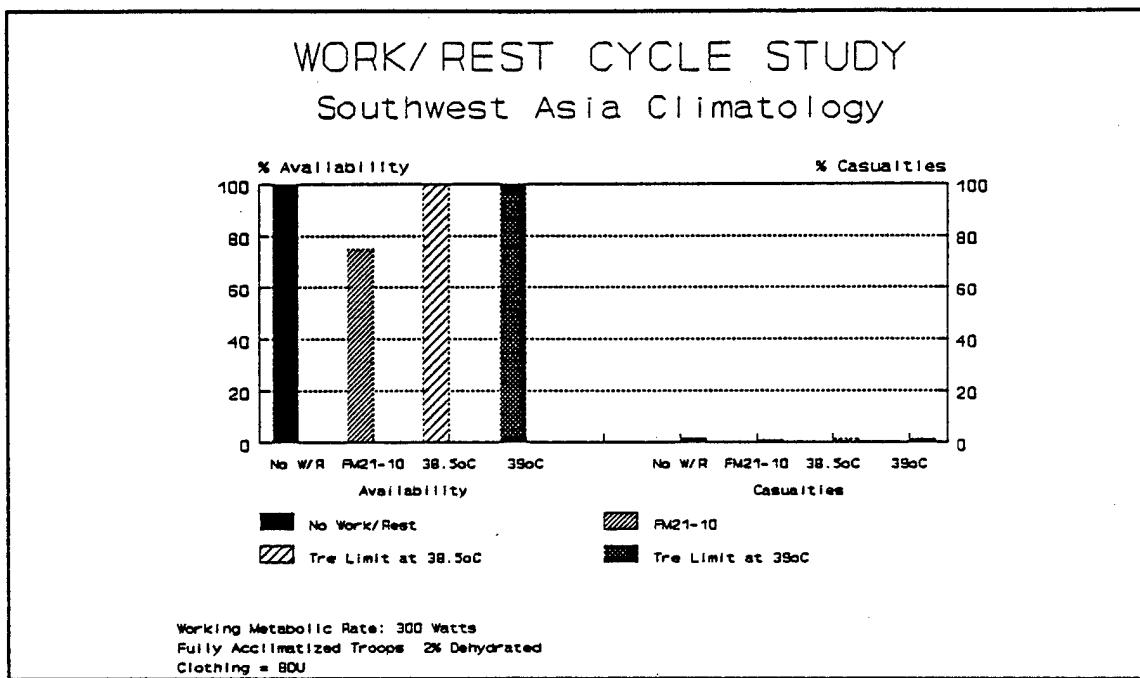
Figure 19.   Availability/Casualties, 300 Watts, Fully
Acclimatized Troops at 2% Dehydration, BDUs, Part 1.

WORK/REST CYCLE STUDY
Southwest Asia Climatology
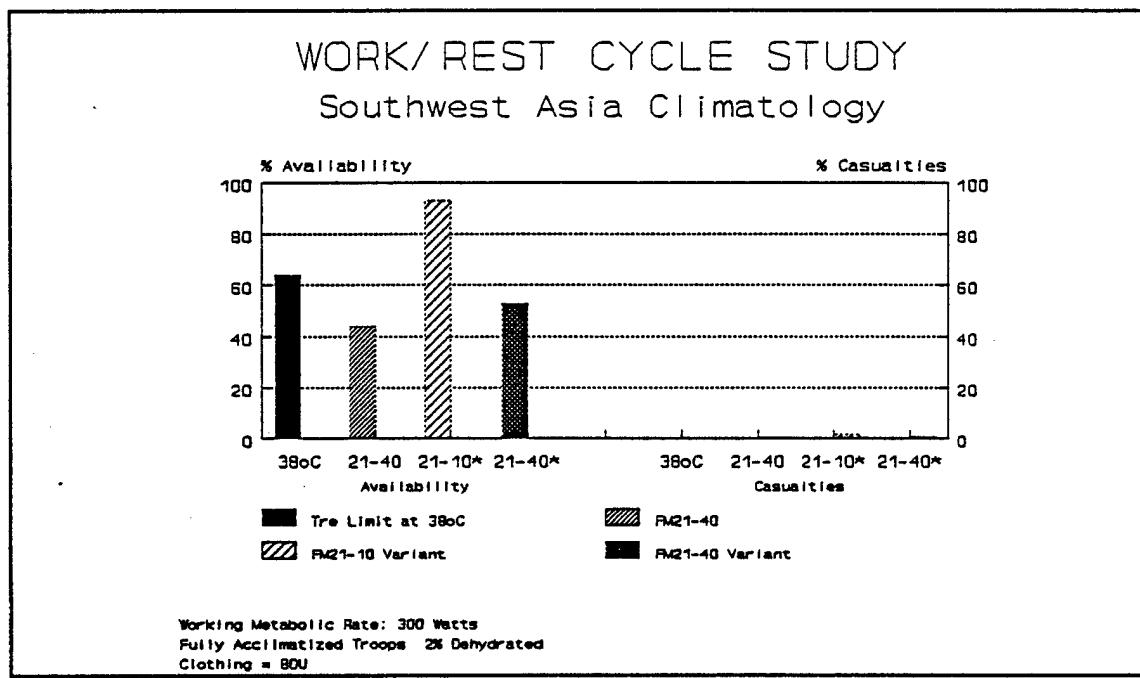
Figure 20.   Availability/Casualties, 300 Watts, Fully
Acclimatized Troops at 2% Dehydration, BDUs, Part 2.

WORK/REST CYCLE STUDY
Southwest Asia Climatology

Working Metabolic Rate: 500 Watts
Fully Acclimatized Troops 2% Dehydrated
Clothing = BDU
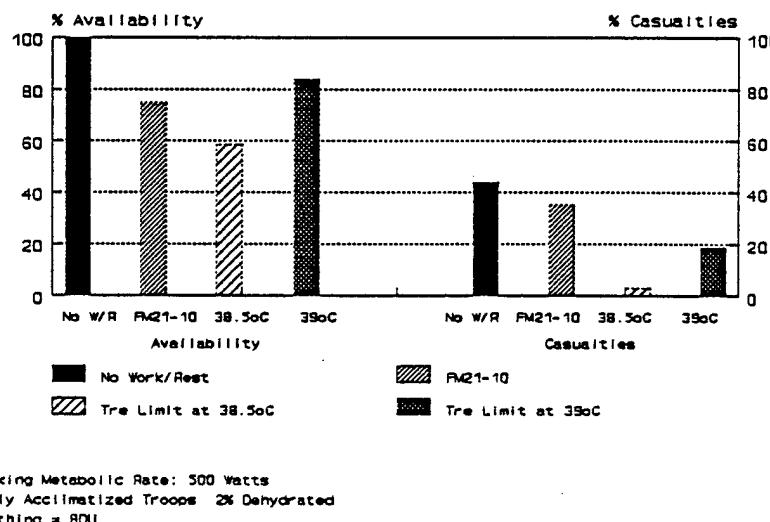
Figure 21. Availability/Casualties, 500 Watts, Fully Acclimatized Troops at 2% Dehydration, BDUs, Part 1.

WORK/REST CYCLE STUDY
Southwest Asia Climatology

Working Metabolic Rate: 500 Watts
Fully Acclimatized Troops 2% Dehydrated
Clothing = BDU
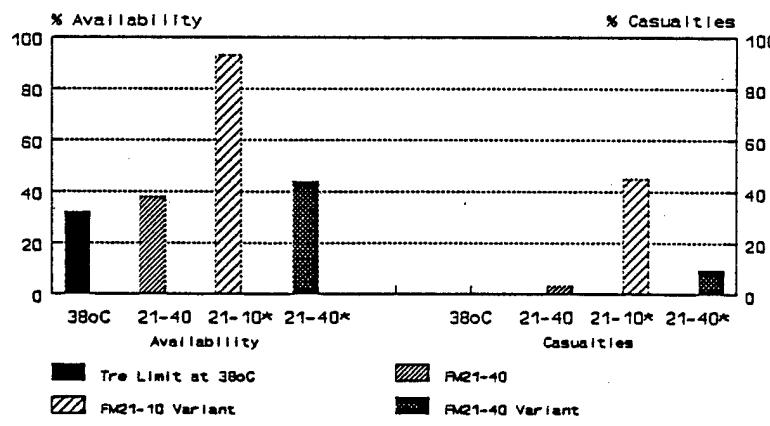
Figure 22. Availability/Casualties, 500 Watts, Fully Acclimatized Troops at 2% Dehydration, BDUs, Part 2.

29
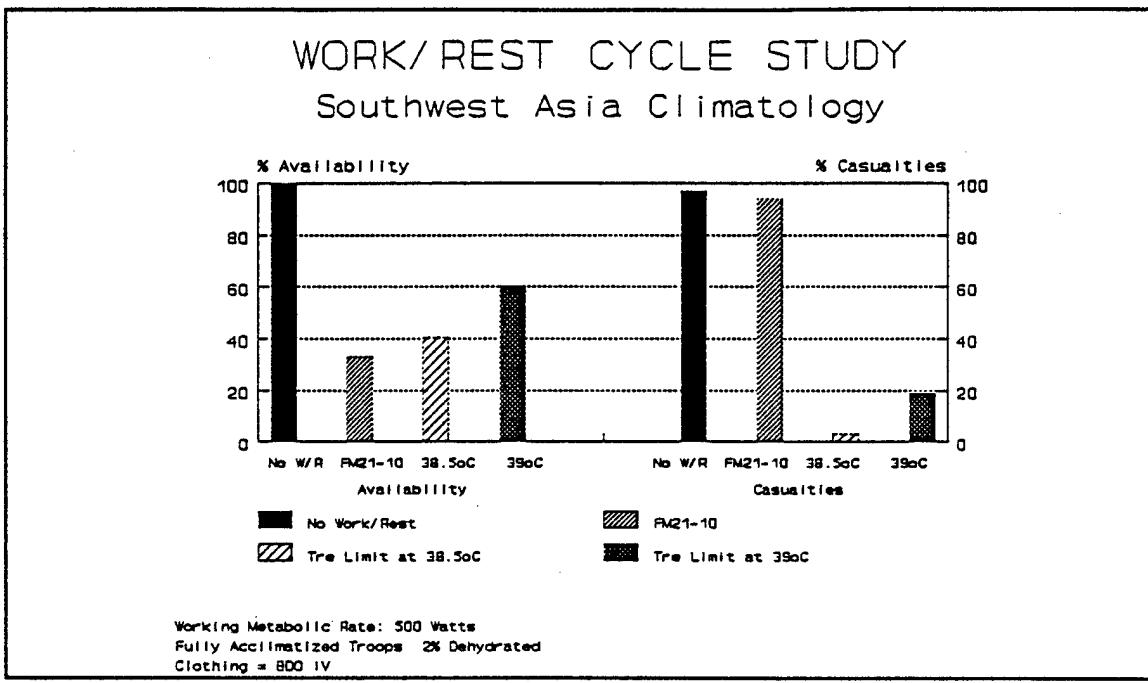
Figure 23. Availability/Casualties, 500 Watts, Fully Acclimatized Troops at 2% Dehydration, BDO4, Part 1.
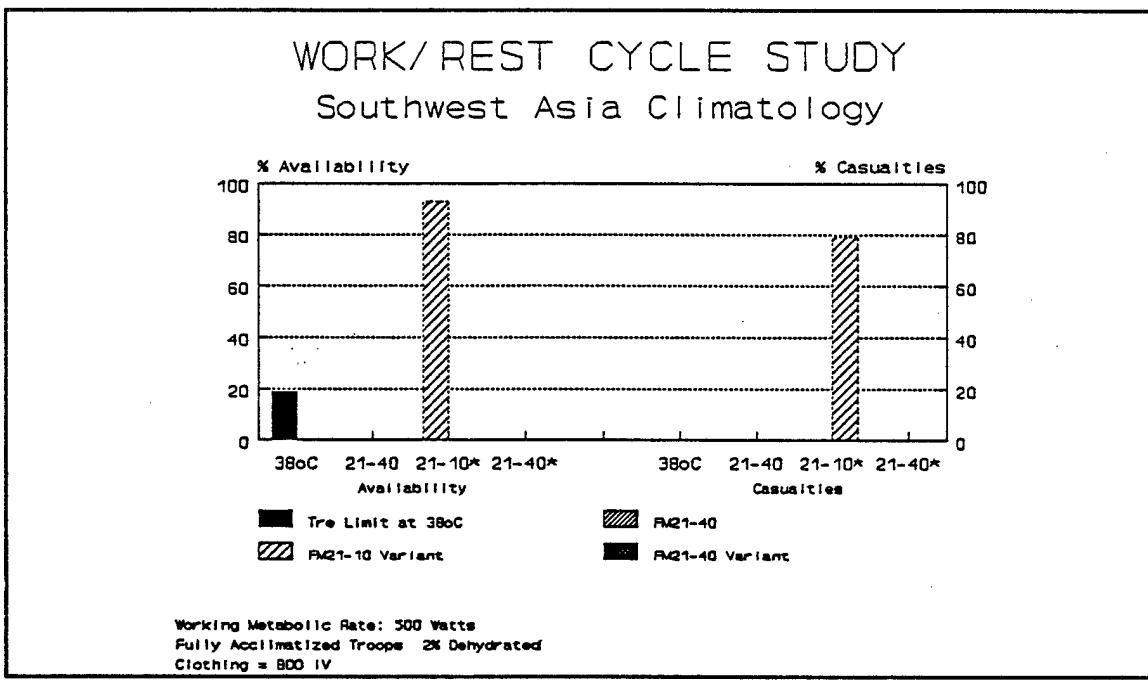
Figure 24. Availability/Casualties, 500 Watts, Fully Acclimatized Troops at 2% Dehydration, BDO4, Part 2.

30

6.5 PRODUCTIVITY

Productivity is the bottom line measure of performance. Productivity is defined as the product of the availability afforded by a particular work discipline and the number of survivors of this discipline. While availability of 100% makes continuous work attractive, a high level of casualties forces us to look for other alternatives. In this case, productivity would be low.

Figures 25 through 27 show productivity for each clothing combination, each work discipline and each level of work intensity. The value shown is an average of all hydration and acclimitization states.
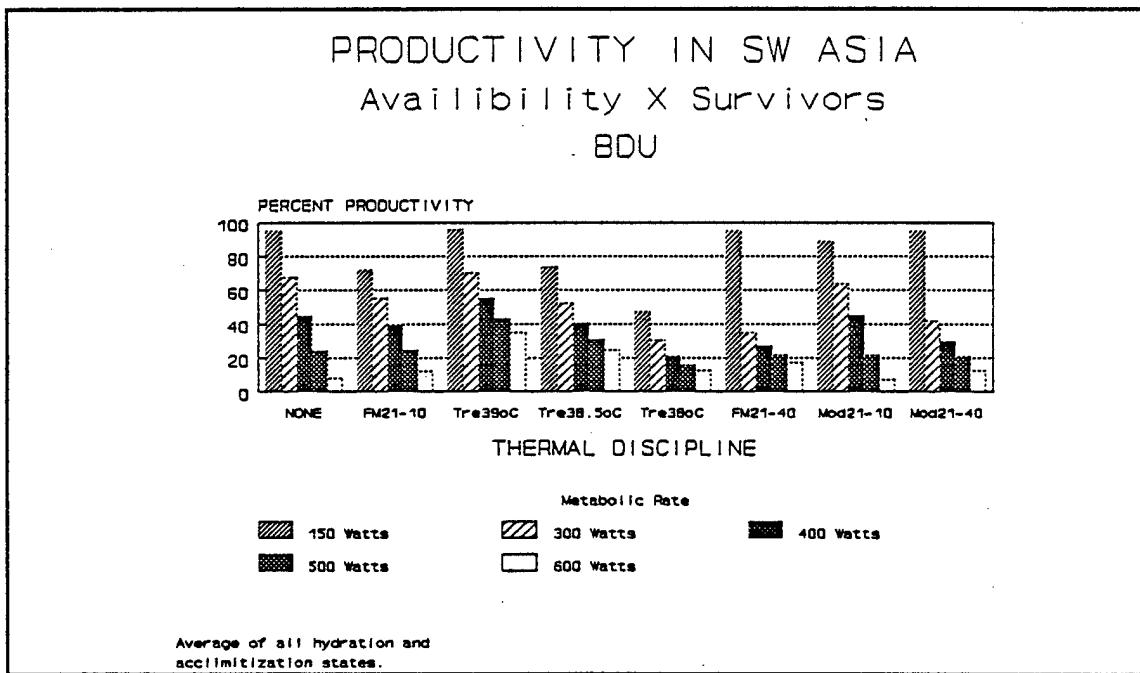
Figure 25. Productivity in SW Asia, BDUs.
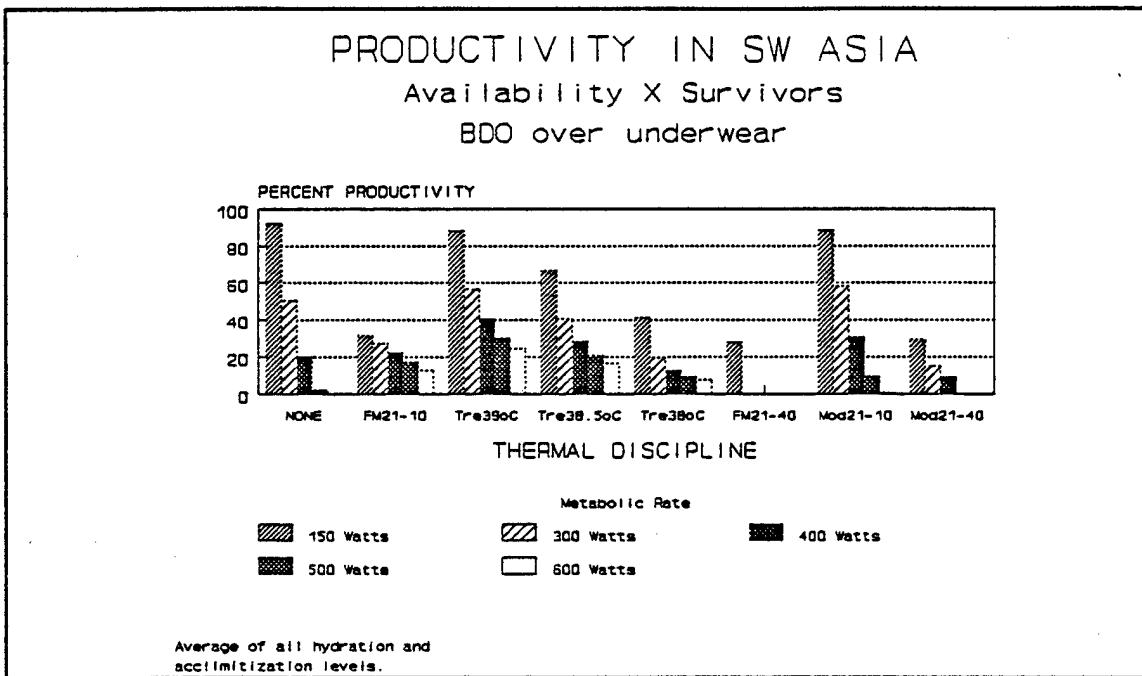
Figure 26. Productivity in SW Asia, BDO4.
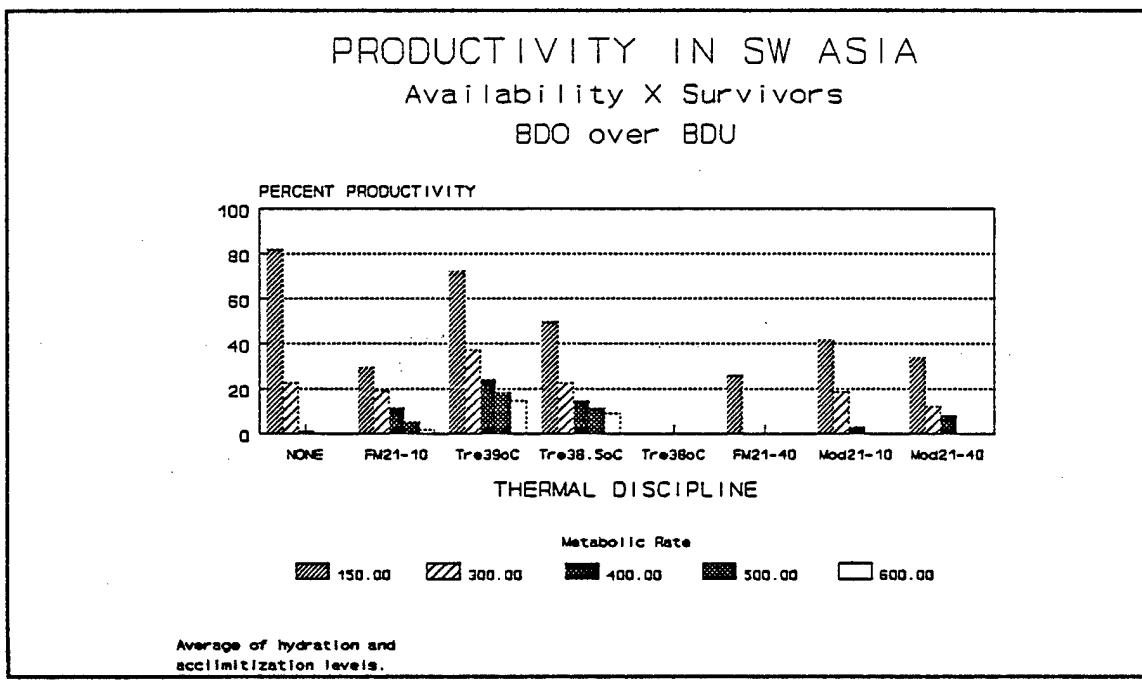
Figure 27. Productivity in SW Asia, BDO over BDU.

The results presented so far have only been a sample of the data generated. An extensive statistical analysis of all the data was completed for this study and a portion of the statisitical analysis is available for examination in APPENDIX E. Tables 7 through 11 contain the general characteristics of the productivity calculations for the 2304 cases.

Table 7. Productivity by Levels of Work Discipline			
Work Discipline	Number of Cases	Mean	Standard Deviation
1. Continuous Work	288	44.35	43.52
2. FM21-10	288	37.13	33.78
3. Metabolic Limit at 39°C	288	55.20	35.78
4. Metabolic Limit at 38.5°C	288	43.90	40.15
5. Metabolic Limit at 38°C	288	30.32	39.78
6. FM21-40	288	29.88	37.86
7. FM21-10 Variant	288	42.61	40.47
8. FM21-40 Variant	288	33.12	36.65

Table 8. Productivity by Levels of Demanded Metabolic Rate.			
Demanded Metabolic Rate (Watts)	Number of Cases	Mean	Standard Deviation
105	384	96.01	6.70
150	384	61.91	36.40
300	384	34.28	32.00
400	384	22.24	26.41
500	384	13.83	20.05
600	384	9.12	14.75

Table 9. Productivity by Levels of Clothing Type.			
Clothing Type	Number of Cases	Mean	Standard Deviation
BDU	768	52.07	38.65
BDO4	768	38.09	39.27
BDO4 over BDU	768	28.53	36.63

Table 10. Productivity by Levels of Acclimatization.			
Days of Acclimatization	Number of Cases	Mean	Standard Deviation
0	576	33.65	38.47
4	576	39.45	39.32
8	576	41.95	39.62
12	576	43.21	39.55

Table 11. Productivity by Levels of Dehydration.			
Dehydration (%)	Number of Cases	Mean	Standard Deviation
0	576	54.77	37.81
2	576	46.29	38.82
4	576	34.14	38.81
6	576	23.05	34.52

Figures 28 and 29 show the productivity values for each work discipline and the differences in these values as compared to current doctrine, FM21-10. The metabolic limit at 39°C case is clearly the best of the disciplines examined, providing almost a 25% increase in productivity over the next best alternative examined (continuous work). When only the more severe cases of low acclimatization and hydration are examined, this difference is even more dramatic.
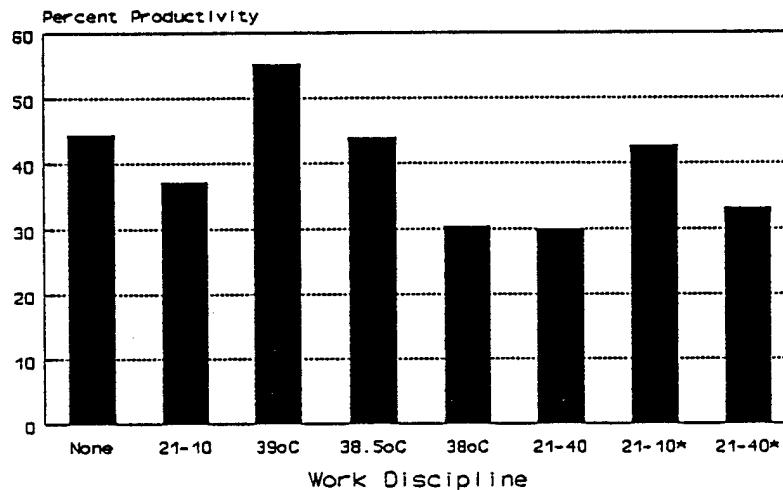
Figure 28. Productivity Means for all Work Disciplines.

Figure 29. Mean Differences in Productivity as Compared to FM21-10 Work Discipline.
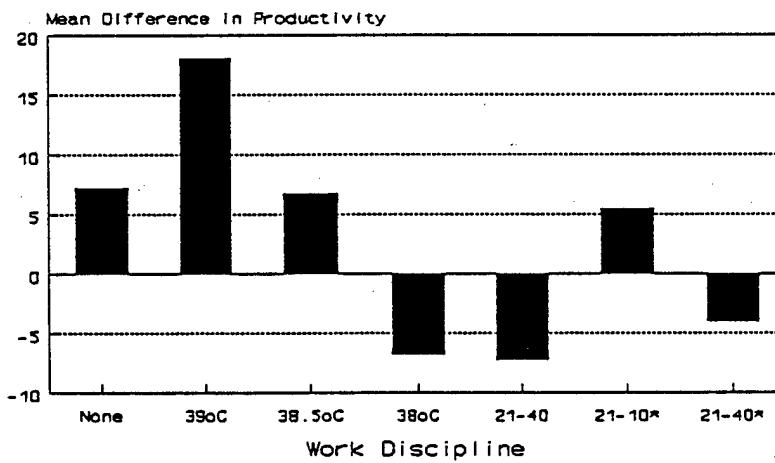
7.   CONCLUSIONS

Three distinct approaches to continuous operations in a hot environment were examined in this report. The first approach, continuous work, reflects a philosophy embodied by the concept that "my people are tough" and ignores physiological reality. This concept was found to work only at the lowest work rates in the hot environment of Southwest Asia in the summer. As the work rate reaches moderate to high levels, the large number of casualties resulted in dramatic lost productivity.

The second approach, work/rest cycles, reflects a philosophy that time-averaged metabolic rates can be used to lower the risk of casualty inherent in continuous work regimens. Four different work/rest disciplines were examined based on tables produced by FM21-10 and FM21-40. FM21-10 is based on WBGT levels and specifies that the values are appropriate for acclimatized, well hydrated, moderate workload tasks. FM21-40 is based on ambient temperature (i.e. dry bulb temperature), workload categories (light, moderate, heavy) and specifies that the values are only appropriate for acclimatized and well hydrated individuals. While the work/rest cycles severely restricted the amount of time spent working, casualties could become prohibitively high in conditions where the workload was high, dehydration was experienced, or acclimatization was less than optimal. The work/rest disciplines associated with both field manuals resulted in many situations in protective equipment that no work could be performed. The guidelines for using these work/rest cycles state that the anticipated highest temperature of the day should be used throughout the day. A modified applications of the work/rest cycles used the tabulated values for the "actual" meteorological values presented throughout the day. This approach was based on the philosophy of tailoring the work/rest cycles more appropriately to the conditions. The changes during the day avoided highly restrictive work/rest cycles during the less thermally stressful times of the day. This modified application of the work/rest discipline did result in marginally increased productivity with similar casualties to the casualty levels resulting from the baseline work/rest discipline.

The third approach, metabolic or core temperature limits, reflects a philosophy of facilitating continuous work, but at a lower work rate. This approach parallels empirical observations on the successful adaptations of people working in a hot environment. Three different implementations, limiting the highest core temperature to 39°C, 38.5°C, and 38°C during work, resulted in dramatic reduction in the number of casualties expected in all conditions. Productivity was maintained at the highest level (for the 39°C case) of all other disciplines examined while casualties were restricted to approximately 18%,

36

3%, and 0.3% respectively for the three implementations. While some of the conditions examined in this study required periods of no work potential, the 39°C was able to extend productive performance to dehydration, acclimatization, and clothing combinations which caused 100% casualties with other alternatives.

A thermal discipline based on the metabolic limit approach offers a real opportunity to reduce the risk of high casualties from operations in the hot environment characteristic of Southwest Asia in the summer. The metabolic limit approach has the additional advantage that the impact of different levels of acclimatization, dehydration, workload, and clothing can be considered within a simple (not simplistic) thermal guidance. In addition to reducing the risk of high casualties, this class of thermal discipline appears to lead to optimizing productivity. This approach can and should be implemented into a tactical decision aid which could be used to produce operational and tactical plans and decisions with realistic expectations. For instance, if a fixed number of rounds must be put on a particular target in a particular amount of time, the mission planner could use a tactical decision aid based on metabolic rate to identify how many tubes (functioning at a rate which is consistent with the maximum metabolic rate for the conditions) must be brought to bear on the target. The fire plan could then be issued for a particular number of rounds fired by a certain number of tubes at a specified firing rate which would not require the personnel in the firing unit to become thermal casualties.

8.   RECOMMENDATIONS

The current implementation of Goldman-Givoni model has not been systematically and rigorously validated against field data. Certain characteristics of the Goldman-Givoni model make such a validation effort essential if simulation is to be used to determine optimal thermal disciplines and tactical decision aides. Questions that must be evaluated include the baseline core temperature for people acclimatized to work in a hot environment (the current model results show that the resting core temperature in hot environments is raised beyond thermo-neutral levels), a non-variant skin temperature over the course of hard work in a variety of clothing, and individual differences in core temperature. Although the best alternatives found in this study used the concept of slowing down the rate of work to accomplish a task more safely, the tactical and operational feasibility of developing this strategy should be tested and compared with work/rest strategies and the physiological feasibility should be tested in the laboratory and in the field.

37

The next generation of thermal stress guidance should pay
close attention to the development of alternative methods of
minimizing thermal strain by the adoption of sound thermal
disciplines. Although current thermal disciplines perform well
for personnel that are well acclimatized, hydrated, and compliant
with doctrine; future disciplines should be simpler to implement
in an operational environment. Future disciplines should
generate safety features which allow for the hydration and
acclimation level of the personnel as well as individual
differences. An important safety feature should be that the need
for "surge" operations during emergency situations should not
immediately place the personnel in extreme casualty risk.

The results of this effort should be carefully evaluated,
then provided to the preventative medicine program and prepared
as commander's guidance to support Operation Desert Shield.
After systematic and rigorous validation of the methodology and
the results from this study are completed, informed transition of
the information to both the preventative medicine program of the
U.S. Army Surgeon General's office and the doctrinal development
programs of the U.S. Army Training and Doctrine Command as
represented by the U.S. Army Academy of Health Science can be
accomplished.

REFERENCES

1. Klopcic, J. Terrence, The AURA Fatigue and Heat Stress Algorithms, BRL-MR-3802, U.S. Army Ballistic Research Laboratory, Aberdeen Proving Ground, MD December 1989.

2. McNally, R.E., M.M Stark, and D.T. Ellzy, Verification and Usage of the Goldman-Givoni Model: Predicting Core Temperature and Casualty Generation in Thermally Stressful Environments, Science Applications International Corporation, April 1990.

3. Berlin, Henry M., Leander Stroschein and Ralph M. Goldman, A Computer Program to Predict Energy Cost, Rectal, Temperature, and Heart Rate Response to Work, Clothing, and Environment, Edgewood Arsenal Special Publication ED-SP-75011, Chemical Systems Laboratory, Aberdeen Proving Ground, MD, November 1975.

4. Matthew, W.T., "Heat Stress Analysis", Heat Research Division, U.S. Army Research Institute of Environmental Medicine, Natick, MA, February 1989.

5. Personal correspondence from Mr. Bill Matthew U.S. Army Research Institute of Environmental Medicine, Natick, MA, 1989.

6. Personal correspondence from Mr. Leander Stroschein, U.S. Army Research Institute of Environmental Medicine, Natick, MA, 1990.

APPENDIX A:
Methodology for Implementing Time-Dependent Predictions
of Core Temperature in Goldman-Givoni Model

The methodology for implementing work/rest discipline, or the consequences of changing clothing, environmental, or workload conditions, in the Goldman-Givoni model is based on three functions. The dominant function within the Goldman-Givoni model is the equation which establishes the difference in core temperature expected at equilibrium. This fundamental function is identical with earlier versions of the Goldman-Givoni model and no changes are required to implement time dependent predictions of core temperature. The functions which describe the delay characteristics after a change in conditions occurs and which describe the rate of change of core temperature are the critical component to adapting the Goldman-Givoni model to reflect the response of core temperature.

The "delay" function and the "rate of change" function are represented in the SAIC implementation of Goldman-Givoni in four subroutines. These routines are the TRETIM, ATTIME, WORK, and RECOV subroutines. The TRETIM subroutine calculates the actual times for which core temperatures will have to be calculated.

The time for changes in environmental conditions, clothing parameters, and metabolic work loads ar input into the TIME array during the interactive phase of program execution (SUBROUTINE RACTIV). The predicted equilibrium core temperature is calculated for each distinct set of conditions is calculated in SUBROUTINE TCORE. The main program passes the calculated core temperature for each set of conditions to SUBROUTINE TRETIM in array TREF. Also passed to SUBROUTINE TRETIM are the times for the start of each set of conditions in array TIME, the change of core temperature based on acclimatization level as array DTREFA, the net metabolic rate in array M, and the wet heat coefficient in array EDIF. All arrays are indexed by a counter, EQUIL, which is incremented for each time that results in a change to environmental conditions, clothing, or work rate. SUBROUTINE TRETIM takes the discrete characteristics of the Goldman-Givoni model and simulates the dynamic, pseudo-continuous time process of changing core temperature over time.

The time domain within this routine is divided into two regions. The first region occurs during the "delay time." The delay time is a period where changes in core temperature are driven by the rate of change of core temperature at the start of the delay period and the magnitude of the change in core temperature necessary to reach equilibrium that results from a change in metabolic rate. The core temperature is calculated every minute during the delay time. The equations in use for calculating core temperature are sensitive to the calculation interval. This sensitivity is the reason behind using a fixed interval of one minute. The second region occurs between the end of the delay time and the next change in conditions. The core temperature in this region can be calculated at any arbitrary time, there is no sensitivity to calculation interval. The core

41

temperature is dependent on the initial core temperature (at the end of the proceeding delay time), the equilibrium core temperature from the current conditions, the time in the period (from the end of the proceeding delay time), and an exponential coefficient which represents the environmental cooling power for recovery or the difference between required and maximum evaporative heat transfer potential.

Within SUBROUTINE TRETIM, it is necessary to set the time delay. For recovery periods the time delay is based on the cooling power (set by the difference between Ereq and Emax), not to exceed 15 minutes.

$$TDELAY=MIN(15.,15.*EXP(-0.5*CPEFF))$$
$$CPEFF=0.015*EDIF(I)$$

where

TDELAY is the time delay in minutes
CPEFF is the cooling power
EDIF(I) is the difference between Ereq and Emax for
the time period I

The time delay for the work conditions is based on the change in the level of energy expenditures. No time delay is generated for work at the same energy expenditure.

$$TDELAY=3480./M(1) \text{ for the initial period}$$
$$or$$
$$TDELAY=3480./(105.+ABS(M(I)-M(I-1)))$$
$$or$$
$$TDELAY=0. \text{ for work at the same metabolic level}$$

The logic that follows within SUBROUTINE TRETIM allows the change in core temperature, DTREF, to vary during the delay time period. A predicted core temperature, TRET, is found for each time. The times are determined in a manner which generates a time every minute during the delay time period and at a user specified interval, DELTIM, (default of 5 minutes) during the remainder of the time before the next change in conditions. While the equilibrium core temperature value remains the same, the core temperature calculated at any time, TRET, is modified during a change in metabolic rate (from changing the work load or from starting a recovery time period). (This approach was inspired by a conversation with Mr. Leander Stroschein on 27 April 1990.)

SUBROUTINE TRETIM generates the relevant time and core temperature data and calls SUBROUTINE ATTIME to calculate a value of core temperature at a given time. SUBROUTINE ATTIME quite simply calls the routine necessary to generate the next core temperature value. The recovery equations are used ONLY for resting personnel and are contained in SUBROUTINE RECOV. The

42

work equations apply to all working periods--with the time delay for working periods proportional to the change in work levels only and are contained in SUBROUTINE WORK.

Within SUBROUTINE RECOV, the exponential coefficient for cooling after the appropriate delay uses the absolute value of the CPEFF. The delay time equation --

$$DELAY=15*exp(-0.5*CPEFF)$$

where

CPEFF >= 0 and

$$DELAY=15$$

where

CPEFF < 0

is based on the cooling power which was generated as discussed above in SUBROUTINE TRETIM.

The principle case with SUBROUTINE RECOV uses the value of the cooling power (CPEFF) to calculate an exponential rate coefficient, KRCY, the core temperature, TRET, at time TIME as follows:

$$KRCY=(1.-EXP(-1.5*ABS(CPEFF)))/40.$$
$$TRET=TRE0 + DTREF*(1.-EXP(-KRCY*(TIME-DELAY)))$$

The above equations are used after the delay time has been completed. TRE0 is the core temperature at the end of the delay time period.

Mr. Leander Stroschein suggested on 27 April 1990 that during the delay time, the core temperature continues to rise at 1/2 the rate per minute that it was rising during the previous time period and that the maximum core temperature that will be achieved will ultimately be used to define the delta that will be used by the recovery period. This approach was modified so that the actual core temperature would be the time-weighted average of the rate of rise with the instantaneous rate of cooling that would occur at the end of the delay period.

$$TRET=TRE0 + RISE * (DELAY-TIME)/DELAY +$$
$$DTREF*(1.-EXP(-KRCY))*TIME/DELAY$$

This approach has the advantage in generating a smooth transition in core temperature at both the beginning and end of the delay period. Note that the 1/2 rate of change per minute is exactly matched in the case where the rate of core temperature change at the end of the delay period approaches zero.

The principle case with SUBROUTINE WORK uses the time delay equation,

$$DELAY = 3480 / M$$

uses the value of net metabolic rate when there is a change of metabolic rate and DELAY = 0 if there is no change in metabolic rate. The value of the change of core temperature (with the benefit of acclimatization eliminated,

$$DTREFC=MAX(0.,DTREF-DTREFA)$$

is used to calculate an exponential rate coefficient, KWRK, as well as the core temperature, TRET, at time TIME as follows:

$$KWRK=(1.+3.*EXP(-.3*(DTREFC)))/120.$$
$$TRET=TRE0 + DTREF*(1.-EXP(-KWRK*(TIME-DELAY)))$$

The above equations are used after the delay time has been completed. TRE0 is the core temperature at the end of the delay time period.

The approach adapted for handling core temperature predictions during a delay period initiated by a change in metabolic rates was approached in a manner analogous to the approach adopted in going for work to a recovery period. The actual core temperature would be the time-weighted average of the rate of change in core temperature of the previous period before the start of the delay period with the instantaneous rate of core temperature change that would occur at the end of the delay period as calculated based on DTREF and KWRK.

$$TRET=TRE0 + RISE * (DELAY-TIME)/DELAY +$$
$$TIME/DELAY*DTREF*(1.-EXP(-KWRK))$$

This approach has the advantage in generating a smooth transition in core temperature at both the beginning and end of the delay period.

APPENDIX B
Goldman-Givoni Source Listing

```fortran
      INTERFACE TO SUBROUTINE ATTIME
     &                    (TRET, TRBEG, DTREF, DTREFA, DELTM,
     &                    DELT, TDELAY, RISE, CPEFF, LAST,
     &                    TIM, VALUE, NEWMET, REST)
      INTEGER DELT, LAST
      REAL CPEFF, DELTM, DTREF, DTREFA, RISE, TDELAY, TIM,
     &     TRBEG, TRET, VALUE
      LOGICAL NEWMET, REST
      DIMENSION VALUE(2,2048)
      END
      INTERFACE TO SUBROUTINE DIGIT
     &                    (MIDPT, LABEL, SCREEN, LINE, AXIS)
      INTEGER MIDPT, LABEL, LINE
      CHARACTER*1 SCREEN, AXIS
      DIMENSION SCREEN(24,80)
      END
      INTERFACE TO SUBROUTINE DISPLA
     &                    (TEMPC, HUMID, WIND, METAB, WEX,
     &                    CLO, IMCLO, GAMMAC, GAMMAI, SKIN, DEHYD,
     &                    DIH, TIME, TREND, LIMIT)
      REAL CLO, GAMMAC, GAMMAI, HUMID, IMCLO, METAB, SKIN, TEMPC,
     &     WIND, DIH, DEHYD, TIME, TREND, WEX
      LOGICAL LIMIT
      END
      INTERFACE TO FUNCTION ERFCTN(X)
      REAL ERFCTN, X
      END
      INTERFACE TO SUBROUTINE INIT
     &                    (AREA, CLO, DEHYD, DIH, GAMMAC, GAMMAI,
     &                    HUMID, IMCLO, METAB, WEX, PATM, SKIN,
     &                    TEMPC, WIND, TREND)
      REAL AREA, CLO, DEHYD, DIH, GAMMAC, GAMMAI, HUMID, IMCLO,
     &     METAB, PATM, SKIN, TEMPC, TREND, WEX, WIND
      END
      INTERFACE TO FUNCTION LASTTM
     &                    (TMBEG, TRBEG, TREND, TDELAY, DTREFA, CPEFF)
      INTEGER LASTTM, TMBEG
      REAL CPEFF, DTREFA, TDELAY, TRBEG, TREND
      END
      INTERFACE TO SUBROUTINE MENU
     &                    (CHOICE, DONE, RUN)
      CHARACTER*2 CHOICE
      LOGICAL DONE, RUN
      END
      INTERFACE TO SUBROUTINE NEWMET
     &                    (METRAT,TREF,TREND,
     &                    FIRST, TOHIGH, TOLOW)
      REAL METRAT, TREF, TREND
      LOGICAL FIRST, TOHIGH, TOLOW
      END
      INTERFACE TO SUBROUTINE PRBCAS(TRE,PROB)
      REAL PROB, TRE
      END
      INTERFACE TO SUBROUTINE PLOT
     &                    (VALUE, SCREEN, TMAX, TMIN,
     &                    COLMAX, COLMIN, ROWMAX, ROWMIN)
      INTEGER ROWMAX, ROWMIN, COLMAX, COLMIN
      REAL TMAX, TMIN, VALUE
      CHARACTER*1 SCREEN
      DIMENSION SCREEN(24,80), VALUE(2,2048)
      END
      INTERFACE TO SUBROUTINE RACTIV
```

46

```
&                        (TEMPC, HUMID, WIND, METAB, WEX,
&                         CLO, IMCLO, GAMMAC, GAMMAI, SKIN, DEHYD,
&                         DIH, TIME, TREND, EQUIL, DONE,
&                         LIMIT)
 INTEGER EQUIL
 REAL CLO, GAMMAC, GAMMAI, HUMID, IMCLO, METAB, SKIN,
&      TEMPC, WIND, DIH, DEHYD, TIME, TREND, WEX
 LOGICAL DONE, LIMIT
C
 DIMENSION TEMPC(128), HUMID(128), WIND(128), METAB(128),
&          WEX(128), CLO(128), IMCLO(128), GAMMAC(128),
&          GAMMAI(128),
&          SKIN(128), DEHYD(128), DIH(128), TIME(128)
 END
 INTERFACE TO SUBROUTINE RECOV
&                        (TRET, TREO, DTREF, TIME, DELAY, RISE,
&                         DELT, CPEFF)
 INTEGER DELT
 REAL CPEFF, DELAY, DTREF, RISE,
&      TREO, TRET, TIME
 END
 INTERFACE TO SUBROUTINE RESULT (VALUE)
 REAL VALUE
 DIMENSION VALUE(2,2048)
 END
 INTERFACE TO SUBROUTINE SAVE
&                        (VALUE, SCREEN, CASUAL, MAXTRE, N)
 INTEGER N
 REAL CASUAL, MAXTRE, VALUE
 CHARACTER*1 SCREEN
 DIMENSION SCREEN(24,80), VALUE(2,2048)
 END
 INTERFACE TO SUBROUTINE SCALER (TIM,SCALE)
 REAL TIM, SCALE
 END
 INTERFACE TO SUBROUTINE SET
&                        (SCREEN,COLMIN,COLMAX,ROWMIN,ROWMAX,TMAX,TMIN)
 INTEGER COLMIN, COLMAX, ROWMIN, ROWMAX
 REAL TMAX, TMIN
 CHARACTER*1 SCREEN
 DIMENSION SCREEN(24,80)
 END
 INTERFACE TO SUBROUTINE SHOW (SCREEN)
 CHARACTER*1 SCREEN
 DIMENSION SCREEN(24,80)
 END
 INTERFACE TO SUBROUTINE TCORE
&                (AREA, CLO, DEHYD, DIH, PATM,
&                 GAMMAC, GAMMAI, HUMID, IMCLO,
&                 METAB, WEX, SKIN, TEMPC, WIND,
&                 TREF, TAU, TLAG, PCAS, DTREFA, M,
&                 EDIF)
 REAL AREA, CLO, DEHYD, DIH, DTREFA,
&      EDIF, GAMMAC, GAMMAI, HUMID,
&      IMCLO, M,
&      METAB, PATM, SKIN, TAU, PCAS, TLAG,
&      TEMPC, TREF, WEX, WIND
 END
 INTERFACE TO SUBROUTINE TRETIM
&                        (VALUE, TIME, TREF, DTREFA, M, EDIF,
&                         EQUIL, LIMIT)
 INTEGER EQUIL
```

47

```
      REAL M, EDIF, DTREFA, TIME,
     &      TREF, VALUE
      LOGICAL LIMIT
      DIMENSION VALUE(2,2048)
      DIMENSION DTREFA(128), M(128), TIME(128), TREF(128),
     &           EDIF(128)
      END
      INTERFACE TO SUBROUTINE WORK
     &                 (TRET, TRE0, DTREF, DTREFA, TIME, DELAY,
     &                  RISE, DELT, NEWMET)
      INTEGER DELT
      REAL DTREF, DTREFA, DELAY,
     &     TRE0, TRET, TIME
      LOGICAL NEWMET
      END
      INTERFACE TO SUBROUTINE XAXIS
     &                 (SCREEN, COLMIN, COLMAX, ROWMAX, SCALE)
      INTEGER COLMAX, COLMIN, ROWMAX
      REAL SCALE
      CHARACTER*1 SCREEN
      DIMENSION SCREEN(24,80)
      END
      INTERFACE TO SUBROUTINE YAXIS
     &                 (SCREEN,ROWMIN,ROWMAX,COLMIN,TMIN,TMAX)
      INTEGER ROWMIN, ROWMAX, COLMIN
      REAL TMIN, TMAX
      CHARACTER*1 SCREEN
      DIMENSION SCREEN(24,80)
      END
C ** PROGRAM **
      PROGRAM GOLDMAN
C*********************************************************
C     THE GOLDMAN-GIVONI MODEL HAS EVOLVED OVER A NUMBER OF
C     YEARS BASED ON EMPIRICAL EQUATIONS DEVELOPED AT THE
C     U.S. ARMY RESEARCH INSTITUTE OF ENVIRONMENTAL MEDICINE
C*********************************************************
      REAL AREA, CLO, DEHYD, DIH, DTREFA, EDIF, GAMMAC, GAMMAI,
     &     HUMID, IMCLO, M, METAB, PATM, PCAS, SKIN, TAU,
     &     TEMPC, TIME, TLAG, TREF, TREND, VALUE, WEX, WIND
      INTEGER EQUIL, T
      CHARACTER PMODE*1
      LOGICAL DONE, FIRST, LIMIT, TOHIGH, TOLOW
C
      DIMENSION VALUE(2,2048)
      DIMENSION AREA(128), CLO(128), DEHYD(128), DIH(128),
     &          DTREFA(128), EDIF(128), GAMMAC(128), GAMMAI(128),
     &          HUMID(128), IMCLO(128),
     &          M(128), METAB(128), PATM(128),
     &          SKIN(128), TEMPC(128), TIME(128),
     &          TREF(128), WEX(128), WIND(128)
C
C     INITIALIZE VARIABLES TO DEFAULT VALUES
C
      EQUIL=0
      DONE=.FALSE.
      LIMIT=.FALSE.
C
      CALL INIT(AREA(1), CLO(1), DEHYD(1), DIH(1), GAMMAC(1),
     &          GAMMAI(1), HUMID(1), IMCLO(1), METAB(1),
     &          WEX(1), PATM(1), SKIN(1), TEMPC(1), WIND(1),
     &          TREND)
C
```

```fortran
C            DISPLAY TCORE MENU OR BEGIN BATCH PROCESSING ROUTINES
C
  10    WRITE(6,FMT='(1X,A25,A39)')
     &              'RUN TCORE (I)NTERACTIVELY',
     &              ' OR TO ESTABLISH METABOLIC RATE (L)IMIT'
        READ(5,FMT='(A1)',ERR=10) PMODE
C
        IF ((PMODE .EQ. 'I') .OR. (PMODE .EQ. 'i')) THEN
          CONTINUE
        ELSE IF ((PMODE .EQ. 'L') .OR. (PMODE .EQ. 'l')) THEN
          LIMIT=.TRUE.
        ELSE
          GOTO 10
        ENDIF
C
  100   CONTINUE
        FIRST=.TRUE.
C
        CALL RACTIV(TEMPC, HUMID, WIND, METAB, WEX,
     &              CLO, IMCLO, GAMMAC, GAMMAI, SKIN, DEHYD,
     &              DIH, TIME, TREND, EQUIL, DONE,
     &              LIMIT)
C
        IF (DONE) GOTO 5000
C
C    START CALCULATIONS
C
CR
CR      WRITE(6,*) '   EQUIL',EQUIL
CR
        DO 1000 T=1,EQUIL
C
  500     CONTINUE
C
        CALL TCORE(AREA(1), CLO(T), DEHYD(T), DIH(T), PATM(1),
     &              GAMMAC(T), GAMMAI(T), HUMID(T), IMCLO(T),
     &              METAB(T), WEX(T), SKIN(T), TEMPC(T), WIND(T),
     &              TREF(T), TAU, TLAG, PCAS, DTREFA(T), M(T),
     &              EDIF(T))
C
        IF (LIMIT) THEN
          IF (ABS(TREF(T)-TREND) .LE. 0.0005) THEN
            WRITE(6,FMT='(1X,A34,A21,F6.2,A4,F6.0,A6)')
     &              'THE METABOLIC RATE WHICH PRODUCES ',
     &              'A FINAL CORE TEMP OF ',TREF(T),
     &              ' IS ',METAB(T),' WATTS'
          ELSE
            CALL NEWMET(METAB(T), TREF(T), TREND,
     &              FIRST, TOHIGH, TOLOW)
            IF (TOHIGH .OR. TOLOW) THEN
              GOTO 100
            ELSE
              GOTO 500
            ENDIF
          ENDIF
        ENDIF
C
CR
CR      WRITE(6,*) ' ',T,' TIME ',TIME(T),' THE VALUE OF TREF'
CR      WRITE(6,*) ' WAS                              ',TREF(T)
CR
 1000 CONTINUE
```

```
C
C              COMPUTE TIME DEPENDENT CORE TEMPERATURE
C
CR
CR
      CALL TRETIM (VALUE, TIME, TREF, DTREFA, M, EDIF,
     &             EQUIL, LIMIT)
C
C         GRAPHICALLY DISPLAY THE INTERACTIVE RESULTS
C                             OR
C                  GENERATE THE OUTPUT FILE
C
      CALL RESULT (VALUE)
C
      IF (.NOT. DONE) GOTO 100
C
 5000 CONTINUE
C
      STOP
      END
C ***SUBROUTINES & FUNCTIONS LISTED IN ALPHAPETICAL ORDER ***
C **A**
      SUBROUTINE ATTIME (TRET, TRBEG, DTREF, DTREFA, DELTM,
     &                   DELT, TDELAY, RISE, CPEFF, LAST,
     &                   TIM, VALUE, NEWMET, REST)
      INTEGER DELT, LAST
      REAL CPEFF, DELTM, DTREF, DTREFA, RISE, TDELAY, TIM,
     &     TRBEG, TRET, VALUE
      LOGICAL NEWMET, REST
C
      DIMENSION VALUE(2,2048)
C
C
C
C    Use the recovery equations ONLY for resting personnel,
C       the work equations apply to all working periods--
C       with the time delay for working periods proportional
C       to the change in work levels only.
C
C       (Conversation with Mr. Leander Stroschein on 27 April
C       1990.)
C
            IF (.NOT. REST) THEN
               CALL WORK (TRET, TRBEG, DTREF, DTREFA, DELTM, TDELAY,
     &                    RISE, DELT, NEWMET)
            ELSE
               CALL RECOV (TRET, TRBEG, DTREF, DELTM, TDELAY, RISE,
     &                     DELT, CPEFF)
            ENDIF
            LAST=LAST+1
            VALUE(1,LAST)=TIM
            VALUE(2,LAST)=TRET
C
      RETURN
      END
C **D**
      SUBROUTINE DIGIT(MIDPT, LABEL, SCREEN, LINE, AXIS)
      INTEGER MIDPT, LABEL, LINE
      CHARACTER*1 SCREEN, STRING, AXIS
C
      DIMENSION SCREEN(24,80), STRING(4)
C
      IF (LINE+1 .GT. 24 .OR. LINE+1 .LT. 1 .OR.
```

50

```fortran
     &     MIDPT .GT. 80 .OR. MIDPT-3 .LT. 1) THEN
        WRITE(6,FMT='(1X,A8,I4,A15,I4,A32)')
     &              'THE ROW ',LINE,' OR THE COLUMN ',MIDPT,
     &              ' EXCEEDED THE ESTABLISHED LIMITS'
        WRITE(6,FMT='(1X)')
        RETURN
      ENDIF
C
      IF (AXIS .EQ. 'X') THEN
        IF (LABEL .LT. 10) THEN
          SCREEN(LINE+1,MIDPT)=CHAR(LABEL+48)
        ELSE IF (LABEL .LT. 100) THEN
          SCREEN(LINE+1,MIDPT-1)=CHAR(LABEL/10+48)
          SCREEN(LINE+1,MIDPT)=CHAR(MOD(LABEL,10)+48)
        ELSE IF (LABEL .LT. 1000 .AND. MIDPT .LT. 79) THEN
          SCREEN(LINE+1,MIDPT-1)=CHAR(LABEL/100+48)
          SCREEN(LINE+1,MIDPT)=CHAR(MOD(LABEL,100)/10+48)
          SCREEN(LINE+1,MIDPT+1)=CHAR(MOD(LABEL,10)+48)
        ELSE IF (LABEL .LT. 1000 .AND. MIDPT .EQ. 79) THEN
          SCREEN(LINE+1,MIDPT-2)=CHAR(LABEL/100+48)
          SCREEN(LINE+1,MIDPT-1)=CHAR(MOD(LABEL,100)/10+48)
          SCREEN(LINE+1,MIDPT)=CHAR(MOD(LABEL,10)+48)
        ELSE IF (LABEL .LT. 10000 .AND. MIDPT .LT. 79) THEN
          SCREEN(LINE+1,MIDPT-2)=CHAR(LABEL/1000+48)
          SCREEN(LINE+1,MIDPT-1)=CHAR(MOD(LABEL,1000)/100+48)
          SCREEN(LINE+1,MIDPT)=CHAR(MOD(LABEL,100)/10+48)
          SCREEN(LINE+1,MIDPT+1)=CHAR(MOD(LABEL,10)+48)
        ELSE IF (LABEL .LT. 10000 .AND. MIDPT .EQ. 79) THEN
          SCREEN(LINE+1,MIDPT-3)=CHAR(LABEL/1000+48)
          SCREEN(LINE+1,MIDPT-2)=CHAR(MOD(LABEL,1000)/100+48)
          SCREEN(LINE+1,MIDPT-1)=CHAR(MOD(LABEL,100)/10+48)
          SCREEN(LINE+1,MIDPT)=CHAR(MOD(LABEL,10)+48)
        ENDIF
      ELSE IF (AXIS .EQ. 'Y') THEN
        IF (LABEL .LT. 10) THEN
          SCREEN(LINE,MIDPT-2)=CHAR(LABEL+48)
        ELSE IF (LABEL .LT. 100) THEN
          SCREEN(LINE,MIDPT-3)=CHAR(LABEL/10+48)
          SCREEN(LINE,MIDPT-2)=CHAR(MOD(LABEL,10)+48)
        ENDIF
      ENDIF
C
      RETURN
      END
C ** D **
      SUBROUTINE DISPLA(TEMPC, HUMID, WIND, METAB, WEX,
     &                  CLO, IMCLO, GAMMAC, GAMMAI, SKIN, DEHYD,
     &                  DIH, TIME, TREND, LIMIT)
      REAL CLO, GAMMAC, GAMMAI, HUMID, IMCLO, METAB, SKIN, TEMPC,
     &     WIND, DIH, DEHYD, TIME, TREND, WEX
      LOGICAL LIMIT
C
      WRITE(6,FMT='(15X,A7,2X,I5,2X,A7)')
     &              'AT TIME',INT(TIME),'minutes'
      WRITE(6,FMT='(1X,A50)')
     &     '**************************************************'
      WRITE(6,FMT='(1X, A34, F6.1, A11)')
     &              ' 1  Temperature                   ',TEMPC,
     &              ' degrees C '
      WRITE(6,FMT='(1X, A34, F6.1, A2)')
     &              ' 2  Relative Humidity             ',HUMID,' %'
      WRITE(6,FMT='(1X, A34, F6.1, A6)')
```

51

```fortran
     &            ' 3  Wind Speed                        ',WIND,' m/sec'
      WRITE(6,FMT='(1X, A34, F6.0, A6)')
     &            ' 4  Metabolic Work Rate              ',METAB,' Watts'
      WRITE(6,FMT='(1X, A34, F6.0, A6)')
     &            ' 5  External Work Completed          ',WEX,' Watts'
      WRITE(6,FMT='(1X, A34, F6.2, A5)')
     &            ' 6  Clothing Insulation              ',CLO,' Clo '
      WRITE(6,FMT='(1X, A34, F6.2)')
     &            ' 7  Im/Clo effective permeability ',IMCLO
      WRITE(6,FMT='(1X, A34, F6.2)')
     &            ' 8  Gamma wind correction (CLO)     ',GAMMAC
      WRITE(6,FMT='(1X, A34, F6.2)')
     &            ' 9  Gamma wind correction (Im/CLO)',GAMMAI
      WRITE(6,FMT='(1X, A34, F6.1, A11)')
     &            ' 10 Skin Temperature                 ',SKIN,
     &            ' degrees C'
      WRITE(6,FMT='(1X,A34,F6.1)')
     &            ' 11 Days in Heat                     ',DIH
      WRITE(6,FMT='(1X,A34,F6.1,A2)')
     &            ' 12 Dehydration                      ',DEHYD,' %'
      IF (LIMIT)
     &WRITE(6,FMT='(1X,A34,F6.2,A3)')
     &            ' 20 Core Temperature Limit           ',TREND,' oC'
      WRITE(6,FMT='(1X,A50)')
     &       '****************************************************'
      WRITE(6,FMT='(1X)')
C
      RETURN
      END
C **E**
      FUNCTION ERFCTN(X)
C*****************************************************************
C        Computes the value of the error function at the point X
C        Ref: C. Hastings, Approximations for Digital Computers,
C         Princeton Univ. Press, Princeton, NJ, 1955
C        Referenced by: CALC
C        External References: None
C*****************************************************************
      REAL A1, A2, A3, A4, A5, A6, ERFCTN, PI, SIGN, X, X2, X3,
     &     X4, X5, X6, XMAX, XMIN, Y
C
      PARAMETER (A1=0.0705230784, A2=0.0422820123, A3=0.0092705272,
     &           A4=0.0001520143, A5=0.0002765672, A6=0.0000430638,

     &           PI=3.14159265, XMIN=1.E-5, XMAX=5.)
C
C     X IS EQUAL TO THE Z-SCORE OF A CUMULATIVE NORMAL DISTRIBUTION
C     * 1/ SQRT(2)      (X = Z * 1/SQRT(2))
C
      IF (X .EQ. 0.) THEN
         ERFCTN=0.0
         GO TO 999
      END IF
C
      SIGN=X/ABS(X)
      X=ABS(X)
C
      IF (X .LT. XMIN) THEN
        ERFCTN=2.*X/SQRT(PI)
      ELSE IF (X .GT. XMAX) THEN
        ERFCTN=1.0
      ELSE
```

```
              X2=X*X
              X3=X2*X
              X4=X3*X
              X5=X4*X
              X6=X5*X
C
              Y=1.+A1*X
              Y=Y+A2*X2
              Y=Y+A3*X3
              Y=Y+A4*X4
              Y=Y+A5*X5
              Y=Y+A6*X6
C
              Y=Y**16
              Y=1./Y
C
              ERFCTN=1.-Y
          END IF
C
          X=SIGN*X
          ERFCTN=SIGN*ERFCTN
C
C     TO GENERATE PROBABILITY ON CUMULATIVE NORMAL DISTRIBUTION
C     RETURN ERF/2 + 0.5
C
          ERFCTN = ERFCTN/2.0 + 0.5
          ERFCTN = ERFCTN * 100.0
C
  999 RETURN
          END
C **I**
          SUBROUTINE INIT(AREA, CLO, DEHYD, DIH, GAMMAC, GAMMAI,
      &                   HUMID, IMCLO, METAB, WEX, PATM, SKIN,
      &                   TEMPC, WIND, TREND)
C******************************************************************
C     Subroutine init initializes the variables used by
C     TCORE to their appropriate defaults
C     Referenced by:  Main program
C     External References: None
C******************************************************************
          REAL AREA, CLO, DEHYD, DIH, GAMMAC, GAMMAI, HUMID, IMCLO,
      &       METAB, PATM, SKIN, TEMPC, TREND, WEX, WIND
C
C     SET DEFAULTS FOR TCORE VARIABLES
C
          SKIN = 36.5
          AREA = 1.8
          WIND = 3.
          GAMMAC = 0.26
          GAMMAI = 0.38
          TEMPC=20
          METAB=425.
          WEX=0.
          HUMID=20
          CLO=1.13
          IMCLO=.43
          PATM=760.
          DIH = 12.
          DEHYD = 0.
          TREND = 38.5
C
          RETURN
```

```
         END
C ** I **
      SUBROUTINE INPUT(TEMPC, HUMID, WIND, METAB, WEX,
     &                 CLO, IMCLO, GAMMAC, GAMMAI, SKIN, DEHYD,
     &                 DIH, TREND, CHOICE, LIMIT)
      REAL CLO, ENTRY, GAMMAC, GAMMAI, HUMID, IMCLO, METAB, SKIN,
     &     TEMPC,
     &     WIND, DIH, DEHYD, TREND, WEX
      CHARACTER*2 CHOICE
      LOGICAL LIMIT
C
      IF (CHOICE .EQ. 'T' .OR. CHOICE .EQ. 't' .OR.
     &    CHOICE .EQ. '1 ') THEN
  21    WRITE(6,FMT='(1X)')
        WRITE(6,FMT='(1X,A41,A11)')
     &                ' Enter the Ambient Temperature in degrees',
     &                ' Centigrade'
        READ(5,*,ERR=21) ENTRY
        IF (ENTRY .GE. -50. .AND. ENTRY .LE. 50.) THEN
          TEMPC=ENTRY
          RETURN
        ELSE
          WRITE(6,FMT='(1X,A11,F6.3,A16)')
     &                ' THE ENTRY ',ENTRY,' IS OUT OF RANGE'
          GOTO 21
        ENDIF
      ELSE IF (CHOICE .EQ. 'H' .OR. CHOICE .EQ. 'h' .OR.
     &         CHOICE .EQ. '2') THEN
  22    WRITE(6,FMT='(1X)')
        WRITE(6,FMT='(1X,A36)')
     &                ' Enter the percent Relative Humidity'
        READ(5,*,ERR=22) ENTRY
        IF (ENTRY .GE. 0. .AND. ENTRY .LE. 100.) THEN
          HUMID=ENTRY
          RETURN
        ELSE
          WRITE(6,FMT='(1X,A11,F6.3,A16)')
     &                ' THE ENTRY ',ENTRY,' IS OUT OF RANGE'
          GOTO 22
        ENDIF
      ELSE IF (CHOICE .EQ. 'W' .OR. CHOICE .EQ. 'w' .OR.
     &         CHOICE .EQ. '3') THEN
  23    WRITE(6,FMT='(1X)')
        WRITE(6,FMT='(1X,A38)')
     &                ' Enter the Wind Speed in meters/second'
        READ(5,*,ERR=23) ENTRY
        IF (ENTRY .GE. 0. .AND. ENTRY .LE. 10.) THEN
          IF (ENTRY .LT. .5) THEN
            ENTRY=0.5
            WRITE(6,FMT='(1X,A38)')
     &                  ' A NOMINAL WIND SPEED OF .5 M/SEC USED'
            WRITE(6,FMT='(1X)')
          ENDIF
          WIND=ENTRY
          RETURN
        ELSE
          WRITE(6,FMT='(1X,A11,F6.3,A16)')
     &                ' THE ENTRY ',ENTRY,' IS OUT OF RANGE'
          GOTO 23
        ENDIF
      ELSE IF (CHOICE .EQ. 'M' .OR. CHOICE .EQ. 'm' .OR.
     &         CHOICE .EQ. '4') THEN
```

54

```fortran
24       WRITE(6,FMT='(1X)')
         WRITE(6,FMT='(1X,A34)')
     &                ' Enter the Metabolic Rate in Watts'
         READ(5,*,ERR=24) ENTRY
         IF (ENTRY .GE. 0. .AND. ENTRY .LE. 800) THEN
           IF (ENTRY .LT. 105.) THEN
             ENTRY=105.
             WRITE(6,FMT='(1X,A43)')
     &             ' A NOMINAL METABOLIC RATE OF 105 WATTS USED'
           ENDIF
           METAB=ENTRY
           RETURN
         ELSE
           WRITE(6,FMT='(1X,A11,F6.3,A16)')
     &             ' THE ENTRY ',ENTRY,' IS OUT OF RANGE'
           GOTO 24
         ENDIF
       ELSE IF (CHOICE .EQ. 'WE' .OR. CHOICE .EQ. 'we' .OR.
     &           CHOICE .EQ. 'We' .OR. CHOICE .EQ. '5') THEN
25       WRITE(6,FMT='(1X)')
         WRITE(6,FMT='(1X,A38)')
     &                ' Enter the External Work Rate in Watts'
         READ(5,*,ERR=25) ENTRY
         IF (ENTRY .GE. 0. .AND. ENTRY .LE. 800) THEN
           WEX=ENTRY
           RETURN
         ELSE
           WRITE(6,FMT='(1X,A11,F6.3,A16)')
     &             ' THE ENTRY ',ENTRY,' IS OUT OF RANGE'
           GOTO 25
         ENDIF
       ELSE IF (CHOICE .EQ. 'C' .OR. CHOICE .EQ. 'c' .OR.
     &           CHOICE .EQ. '6') THEN
26       WRITE(6,FMT='(1X)')
         WRITE(6,FMT='(1X,A43)')
     &                ' Enter the Clothing Insulation Value in Clo'
         READ(5,*,ERR=26) ENTRY
         IF (ENTRY .GE. .65 .AND. ENTRY .LE. 5.) THEN
           CLO=ENTRY
           RETURN
         ELSE
           WRITE(6,FMT='(1X,A11,F6.3,A16)')
     &             ' THE ENTRY ',ENTRY,' IS OUT OF RANGE'
           GOTO 26
         ENDIF
       ELSE IF (CHOICE .EQ. 'I' .OR. CHOICE .EQ. 'i' .OR.
     &     CHOICE .EQ. '7') THEN
27       WRITE(6,FMT='(1X)')
         WRITE(6,FMT='(1X,A46,A15)')
     &        ' Enter the effective permiability coefficient',
     &                'known as Im/Clo'
         READ(5,*,ERR=27) ENTRY
         IF (ENTRY .GE. .0 .AND. ENTRY .LE. 1.) THEN
           IMCLO=ENTRY
           RETURN
         ELSE
           WRITE(6,FMT='(1X,A11,F6.3,A16)')
     &             ' THE ENTRY ',ENTRY,' IS OUT OF RANGE'
           GOTO 27
         ENDIF
       ELSE IF (CHOICE .EQ. 'G' .OR. CHOICE .EQ. 'g' .OR.
     &           CHOICE .EQ. '8') THEN
```

```fortran
28      WRITE(6,FMT='(1X)')
        WRITE(6,FMT='(1X,A46,A25)')
     &          ' Enter the wind speed corrrection coefficient',
     &              'GAMMA for CLO '
        READ(5,*,ERR=28) ENTRY
        IF (ENTRY .GE. .15 .AND. ENTRY .LE. .5) THEN
          GAMMAC=ENTRY
          RETURN
        ELSE
          WRITE(6,FMT='(1X,A11,F6.3,A16)')
     &              ' THE ENTRY ',ENTRY,' IS OUT OF RANGE'
          GOTO 28
        ENDIF
       ELSE IF (CHOICE .EQ. 'G' .OR. CHOICE .EQ. 'g' .OR.
     &          CHOICE .EQ. '9') THEN
29      WRITE(6,FMT='(1X)')
        WRITE(6,FMT='(1X,A46,A25)')
     &          ' Enter the wind speed corrrection coefficient',
     &              'GAMMA Im/CLO'
        READ(5,*,ERR=29) ENTRY
        IF (ENTRY .GE. .15 .AND. ENTRY .LE. .5) THEN
          GAMMAI=ENTRY
          RETURN
        ELSE
          WRITE(6,FMT='(1X,A11,F6.3,A16)')
     &              ' THE ENTRY ',ENTRY,' IS OUT OF RANGE'
          GOTO 29
        ENDIF
       ELSE IF (CHOICE .EQ. 'S' .OR. CHOICE .EQ. 's' .OR.
     &     CHOICE .EQ. '10') THEN
30      WRITE(6,FMT='(1X)')
        WRITE(6,FMT='(1X,A49)')
     &     ' Enter the skin temperature in degrees Centigrade'
        READ(5,*,ERR=30) ENTRY
        IF (ENTRY .GE. 0. .AND. ENTRY .LE. 40.) THEN
          SKIN=ENTRY
          RETURN
        ELSE
          WRITE(6,FMT='(1X,A11,F6.3,A16)')
     &              ' THE ENTRY ',ENTRY,' IS OUT OF RANGE'
          GOTO 30
        ENDIF
       ELSE IF (CHOICE .EQ. 'DA' .OR. CHOICE .EQ. 'da' .OR.
     &     CHOICE .EQ. 'Da' .OR. CHOICE .EQ. '11') THEN
31      WRITE(6,FMT='(1X)')
        WRITE(6,FMT='(1X,A29)')
     &              ' Enter number of days in heat'
        READ(5,*,ERR=31) ENTRY
        IF (ENTRY .GE. 0.) THEN
          DIH = ENTRY
          RETURN
        ELSE
          WRITE(6,FMT='(1X,A11,F6.3,A16)')
     &              ' THE ENTRY ',ENTRY,' IS OUT OF RANGE'
          GOTO 31
        ENDIF
       ELSE IF (CHOICE .EQ. 'DE' .OR. CHOICE .EQ. 'de' .OR.
     &     CHOICE .EQ. 'De' .OR. CHOICE .EQ. '12') THEN
32      WRITE(6,FMT='(1X)')
        WRITE(6,FMT='(1X,A27)')
     &              ' Enter level of dehydration'
        READ(5,*,ERR=32) ENTRY
```

```fortran
           IF (ENTRY .GE. 0.) THEN
             DEHYD = ENTRY
             RETURN
           ELSE
             WRITE(6,FMT='(1X,A11,F6.3,A16)')
     &                  ' THE ENTRY ',ENTRY,' IS OUT OF RANGE'
             GOTO 32
           ENDIF
         ELSE IF (LIMIT .AND. (CHOICE .EQ. 'L') .OR.
     &       CHOICE .EQ. '1' .OR. CHOICE .EQ. '20') THEN
 40        WRITE(6,FMT='(1X)')
           WRITE(6,FMT='(1X,A43)')
     &                  ' Enter desired equilibrium core temperature'
           READ(5,*,ERR=40) ENTRY
           IF (ENTRY .GE. 36. .AND. ENTRY .LE. 42) THEN
             TREND = ENTRY
             RETURN
           ELSE
             WRITE(6,FMT='(1X,A11,F6.3,A16)')
     &                  ' THE ENTRY ',ENTRY,' IS OUT OF RANGE'
             GOTO 40
           ENDIF
         ELSE
           WRITE(6,FMT='(1X,A12,A1,A19)')
     &              ' THE ENTRY :',CHOICE,': IS NOT ACCEPTABLE'
           WRITE(6,FMT='(1X)')
           WRITE(6,FMT='(1X,A17)')
     &                  ' PLEASE TRY AGAIN'
         ENDIF
C
       RETURN
       END
C **L**
       FUNCTION LASTTM (TMBEG, TRBEG, TREND, TDELAY, DTREFA, CPEFF)
       INTEGER LASTTM, TMBEG
       REAL CPEFF, DTREF, DTREFA, K, TDELAY, TRBEG, TREND
C
       DTREF=TREND-TRBEG
C
C  Coefficient K is extracted from the work and recovery
C    subroutines called by TRETIM
C
       IF (DTREF .GT. 0.) THEN
         K=(1.+3.*EXP(-.3*(DTREF-DTREFA)))/120.
       ELSE IF (DTREF .LT. 0.) THEN
         K=(1.-EXP(-1.5*ABS(CPEFF)))/40.
       ELSE
         K=1.
       ENDIF
       IF (K .LT. .005) K=.005
C
C  This formulation is the solution of the time dependent
C    equations in WORK and RECOV subroutines
C    and THE approximate solution that EXP(-ARG)=0
C         WHEN ARG <=23.03
C
C   As an expedient, assume that the time to reach essential
C    equilibrium is no more than 240 minutes, therefore fix
C    the smallest allowed value of K to that level.
       LASTTM=TMBEG+NINT(TDELAY+MIN(240.,23.03/K))
C
CR
```

```
CR        WRITE(6,*) ' THE EQUILIBRIUM TIME WAS ',LASTTM
CR        WRITE(6,*)     ' FOR STARTING TRE OF ',TRBEG
CR        WRITE(6,*)        ' AND ENDING TRE OF ',TREND
CR        WRITE(6,*) ' FOR CONDITIONS STARTED AT ',TMBEG
CR
          RETURN
          END
C **M**
          SUBROUTINE MENU (CHOICE, DONE, RUN)
          CHARACTER*2 CHOICE
          LOGICAL DONE, LIMIT, RUN
C
  100     CONTINUE
              CHOICE = '  '
          WRITE(6,FMT='(1X,A34)')
       &               ' 99 Change the time to a new value'
          WRITE(6,FMT='(1X,A37)')
       &               ' 0  Execute TCORE with current values'
          WRITE(6,FMT='(1X,A14)')
       &               ' E  Exit TCORE'
          WRITE(6,FMT='(1X,A28)')
       &               ' SELECT A NUMBER TO CONTINUE'
          READ(5,'(A2)',ERR=100) CHOICE
C
          IF (CHOICE .EQ. 'E' .OR. CHOICE .EQ. 'e') THEN
            DONE=.TRUE.
          ELSE IF (CHOICE .EQ. '0') THEN
            RUN=.TRUE.
          ENDIF
C
          RETURN
          END
C **N**
          SUBROUTINE NEWMET (METRAT,TREF,TREND,
       &                        FIRST, TOHIGH, TOLOW)
          REAL HIMET, LOMET, METRAT, TREF, TREND
          LOGICAL FIRST, TOHIGH, TOLOW
C
          TOLOW=.FALSE.
          TOHIGH=.FALSE.
          IF (FIRST) THEN
            HIMET=1000.
            LOMET=50.
            FIRST=.FALSE.
          ENDIF
C
          IF (METRAT .LT. LOMET .OR. METRAT .GT. HIMET) THEN
            STOP 'NEWMET HAS AN ERROR'
          ENDIF
C
          IF (TREF .GT. TREND) THEN
            HIMET=MIN(METRAT,HIMET)
            METRAT=(METRAT+LOMET)/2.
            IF (METRAT-LOMET .LT. .01) THEN
              TOLOW=.TRUE.
              WRITE(6,FMT='(1X,A30,1X,A27,2X, F4.0,A5)')
       &                   'These conditions would require',
       &                   'a metabolic rate lower than',LOMET,
       &                   'Watts'
            ENDIF
          ELSE IF (TREF .LT. TREND) THEN
            LOMET=MAX(METRAT,LOMET)
```

58

```fortran
      METRAT=(METRAT+HIMET)/2.
      IF (HIMET-METRAT .LT. .01) THEN
        TOHIGH=.TRUE.
        WRITE(6,FMT='(1X,A30,1X,A28,2X,F6.0,A5)')
     &                'These conditions would require',
     &                'a metabolic rate higher than',HIMET,
     &                'Watts'
      ENDIF
      ELSE
        WRITE(6,FMT='(1X,A23)') 'ERROR IN NEWMET ROUTINE'
      ENDIF
C
      RETURN
      END
C **P**
      SUBROUTINE PRBCAS(TRE,PROB)
      REAL ERFCTN, MEAN, MODZ, PROBAB, STDDEV, SQRT2, TRE
C
C     PROBABILITY OF CASUALTY IS APPROXIMATED AS A CUMULATIVE
C     NORMAL DISTRIBUTION WITH THE MEAN EQUAL TO 39.5 AND THE
C     STD. DEV. EQUAL TO .5198
C           (THE BEST FIT TO THE NIOSH AND PANDOFF DATA)
C
      SQRT2=SQRT(2.)
      MEAN = 39.5
      STDDEV = .5198
C
      MODZ = (TRE-MEAN)/STDDEV * 1/SQRT2
C
      PROB = ERFCTN(MODZ)
      PROB = AMAX1(PROB,0.)
      PROB = AMIN1(PROB,100.)
C
      RETURN
      END
C ** P **
      SUBROUTINE PLOT (VALUE, SCREEN, TMAX, TMIN,
     &                 COLMAX, COLMIN, ROWMAX, ROWMIN)
      INTEGER COUNT, I, MAXT, ROWMAX, ROWMIN, COLMAX, COLMIN,
     &        X, Y
      REAL TIM, TMAX, TMIN, VALUE, XSCALE, YSCALE, SCALE
      CHARACTER*1 SCREEN, HIT, MISS
      LOGICAL WRONG
C
      DIMENSION SCREEN(24,80), VALUE(2,2048)
C
      HIT='O'
      MISS='*'
      TIM=0.
      COUNT=0
C
      DO 10 I=1,1024
        IF (I .EQ. 1 .OR.
     &     (I .GT. 1 .AND. VALUE(2,I) .GT. 0.)) THEN
          TIM=MAX(VALUE(1,I),TIM)
          COUNT=COUNT+1
        ENDIF
 10   CONTINUE
CR
CR    WRITE(6,*) ' THE VALUE OF COUNT IS ',COUNT
CR    WRITE(6,*) ' AND THE TIME IS ',TIM
CR
```

59

```
C
        CALL SCALER (TIM, SCALE)
CR
CR      WRITE(6,*) ' THE SCALE FOR THE X AXIS IS ',SCALE
CR
C

        XSCALE=FLOAT(COLMAX-COLMIN)/SCALE
        CALL XAXIS (SCREEN, COLMIN, COLMAX, ROWMAX, SCALE)
        YSCALE=REAL(ROWMAX-ROWMIN)/REAL(NINT(TMAX)-INT(TMIN))
CR
CR      WRITE(6,*) ' THE VALUE OF XSCALE & YSCALE IS ',
CR    &               XSCALE,'  ',YSCALE
C
        DO 20 I=1,COUNT
          WRONG=.FALSE.
          X=COLMIN+NINT(XSCALE*VALUE(1,I))
          Y=ROWMAX-NINT(YSCALE*(VALUE(2,I)-TMIN))
C
          IF (X .LT. COLMIN .OR. X .GT. COLMAX) THEN
CR           WRITE(6,FMT='(1X,A15,I2,A18,I2,A1,I2,A2)')
CR    &                    'THE X VALUE OF ',X,'IS OUT OF RANGE [',
CR    &                    COLMIN,',',COLMAX,'] '
            WRONG=.TRUE.
          ENDIF
C
          IF (Y .LT. ROWMIN .OR. Y .GT. ROWMAX) THEN
CR            WRITE(6,FMT='(1X,A15,I2,A18,I2,A1,I2,A2)')
CR    &                    'THE Y VALUE OF ',Y,' IS OUT OF RANGE [',
CR    &                    ROWMIN,',',ROWMAX,'] '
            WRONG=.TRUE.
          ENDIF
C
          IF (.NOT. WRONG) THEN
            SCREEN(Y,X) = HIT
          ELSE IF (WRONG .AND.
     &             X .GE. COLMIN .AND. X .LE. COLMAX) THEN
            IF (Y .LT. ROWMIN) THEN
              SCREEN(ROWMIN,X)=MISS
            ELSE IF (Y .GT. ROWMAX) THEN
              SCREEN(ROWMAX,X)=MISS
            ENDIF
          ELSE IF (WRONG .AND.
     &             Y .GE. ROWMIN .AND. Y .LE. ROWMAX) THEN
            IF (X .LT. COLMIN) THEN
              SCREEN(Y,COLMIN)=MISS
            ELSE IF (X .GT. COLMAX) THEN
              SCREEN(Y,COLMAX)=MISS
            ENDIF
          ELSE IF (X .LT. COLMIN .AND. Y .LT. ROWMIN) THEN
            SCREEN(ROWMIN,COLMIN)=MISS
          ELSE IF (X .LT. COLMIN .AND. Y .GT. ROWMAX) THEN
            SCREEN(ROWMAX,COLMIN)=MISS
          ELSE IF (X .GT. COLMAX .AND. Y .LT. ROWMIN) THEN
            SCREEN(ROWMIN,COLMAX)=MISS
          ELSE IF (X .GT. COLMAX .AND. Y .GT. ROWMAX) THEN
            SCREEN(ROWMAX,COLMAX)=MISS
          ENDIF
CR
CR      WRITE(6,*) ' FOR TIME=',VALUE(1,I),' THE TEMP=',VALUE(2,I)
CR      WRITE(6,*) ' FOR ROW ',Y,'       AND COLUMN ',X
CR      WRITE(6,*) ' THE VALUE IS :',SCREEN(Y,X),':'
CR
```

60

```
   20    CONTINUE
C
       RETURN
       END
C **R**
       SUBROUTINE RACTIV (TEMPC, HUMID, WIND, METAB, WEX,
      &                   CLO, IMCLO, GAMMAC, GAMMAI, SKIN, DEHYD,
      &                   DIH, TIME, TREND, EQUIL, DONE,
      &                   LIMIT)
C******************************************************************
C      Subroutine inteRACTIVe queries the user, in menu style,
C      as to whether the user wishes to 1) change input variables,
C      2) run TCORE (calculate Equilibrium Core Temperature and
C      PRBCAS) or 3) exit TCORE
C      Referenced by:  Main Program
C      External Reference:  None
C******************************************************************
       INTEGER EQUIL, T
       REAL CLO, ENTRY, GAMMAC, GAMMAI, HUMID, IMCLO, METAB, SKIN,
      &      TEMPC, WIND, DIH, DEHYD, TIME, TREND, WEX
       CHARACTER*2 CHOICE
       LOGICAL DONE, LIMIT, RUN
C
       DIMENSION TEMPC(128), HUMID(128), WIND(128), METAB(128),
      &          WEX(128), CLO(128), IMCLO(128), GAMMAC(128),
      &          GAMMAI(128),
      &          SKIN(128), DEHYD(128), DIH(128), TIME(128)
C
C
C
       T=1
       EQUIL=T
C
  100  CALL DISPLA (TEMPC(T),HUMID(T), WIND(T), METAB(T), WEX(T),
      &          CLO(T), IMCLO(T), GAMMAC(T), GAMMAI(T), SKIN(T),
      &          DEHYD(T),
      &          DIH(T), TIME(T), TREND, LIMIT)
C
       RUN=.FALSE.
C
  200  CALL MENU (CHOICE, DONE, RUN)
C
       IF (DONE .OR. RUN) THEN
         RETURN
       ELSE IF (CHOICE .EQ. '99' .OR. CHOICE .EQ. 'TI' .OR.
      &         CHOICE .EQ. 'Ti' .OR. CHOICE .EQ. 'ti') THEN
         IF (LIMIT) THEN
           WRITE(6,FMT='(1X,A30,A30)')
      &              'TIME CHANGES NOT ALLOWED WHEN ',
      &              'SELECTING METABOLIC RATE LIMIT'
           GOTO 100
         ENDIF
         T=T+1
C
  300    WRITE(6,FMT='(1X)')
         WRITE(6,FMT='(1X,A46)')
      &      ' Enter the beginning time for these conditions'
         READ(5,*,ERR=300) TIME(T)
         IF (TIME(T) .LT. TIME(T-1) .OR. TIME(T) .GT. 1440.) THEN
           WRITE(6,FMT='(1X,A11,F6.3,A16)')
      &              ' THE ENTRY ',TIME(T),' IS OUT OF RANGE'
           WRITE(6,FMT='(1X,A12,1X,I6,2X,A13,A6)')
```

61

```
     &                        'IT MUST BE >',TIME(T-1),'AND LESS THAN',
     &                        ' 1 DAY'
            TIME(T)=0.
            GOTO 300
          ENDIF
          WRITE(6,FMT='(1X)')
C
          IF (T .GT. 126) THEN
            WRITE(6,FMT='(1X,A29)') 'TOO MANY TIMES TO ADD ANOTHER'
            WRITE(6,FMT='(1X,A16)') 'PLEASE TRY AGAIN'
            GOTO 200
          ENDIF
C
          TEMPC(T)=TEMPC(T-1)
          HUMID(T)=HUMID(T-1)
          WIND(T)=WIND(T-1)
          METAB(T)=METAB(T-1)
          WEX(T)=WEX(T-1)
          CLO(T)=CLO(T-1)
          IMCLO(T)=IMCLO(T-1)
          GAMMAC(T)=GAMMAC(T-1)
          GAMMAI(T)=GAMMAI(T-1)
          SKIN(T)=SKIN(T-1)
          DEHYD(T)=DEHYD(T-1)
          DIH(T)=DIH(T-1)
          EQUIL=T
          GOTO 100
        ENDIF
C
  500   CALL INPUT (TEMPC(T),HUMID(T), WIND(T), METAB(T), WEX(T),
     &                CLO(T), IMCLO(T), GAMMAC(T), GAMMAI(T), SKIN(T),
     &                DEHYD(T),
     &                DIH(T), TREND, CHOICE, LIMIT)
C
        GOTO 100
C
        RETURN
        END
C ** R **
        SUBROUTINE RECOV (TRET, TRE0, DTREF, TIME, DELAY, RISE,
     &                     DELT, CPEFF)
        INTEGER DELT
        REAL CPEFF, DELAY, DTREF, KRCY, OLDTRE, RISE,
     &       TRE0, TRET, TIME
C
C   The exponential coefficient for cooling after the appropriate
C      delay uses the absolute value of the CPEFF.  The delay time
C      equation -- DELAY=15*exp(-0.5*CPEFF) where
C                  CPEFF >= 0 and
C                  DELAY=15 where
C                  CPEFF < 0
C
C   Further note that during the delay time, the core temperature
C      continues to rise at 1/2 the rate per minute that it was
C      rising during the previous time period and that the maximum
C      core temperature that will be achieved will ultimately be
C      used to define the delta that will be used by the recovery
C      period.
C
C      (Conversation with Mr. Leander Stroschein on 27 April
C      1990.)
C
```

62

```
        OLDTRE=TRET
        KRCY=(1.-EXP(-1.5*ABS(CPEFF)))/40.
CR
        IF (CPEFF .LT. 0.) WRITE(6,FMT='(1X,A19,F6.2,A19)')
     &       'THE VALUE OF CPEFF ',CPEFF,' WAS LESS THAN ZERO'
CR
C
        IF (TIME .GT. DELAY .OR. DELAY .EQ. 0) THEN
          TRET=TRE0 + DTREF*(1.-EXP(-KRCY*(TIME-DELAY)))
          IF (DELT .GT. 0) RISE=(TRET-OLDTRE)/REAL(DELT)
        ELSE
          TRET=TRE0 + RISE * (DELAY-TIME)/DELAY +
     &         DTREF*(1.-EXP(-KRCY))*TIME/DELAY
        ENDIF
CR
CR      WRITE(6,*) ' FOR RESTING TIME=',TIME
CR      WRITE(6,*) ' THE STARTING CORE TEMPERATURE OF   ',TRE0
CR    WRITE(6,*) ' AND THE ENDING CORE TEMPERATURE OF ',TRE0+DTREF
CR      WRITE(6,*) ' RESULTED IN A TEMPERATURE OF        ',TRET
CR
C
C
        RETURN
        END
C ** R **
        SUBROUTINE RESULT (VALUE)
C
        INTEGER I, ROWMIN, ROWMAX, COLMIN, COLMAX, MAXT, N
        REAL TMAX, TMIN, VALUE, MAXTRE, CASUAL
        CHARACTER*1 ANS, SCREEN, POINT, HIT, MISS
C
        PARAMETER (ROWMIN=1,ROWMAX=21,COLMIN=4,COLMAX=79,
     &             TMAX=41.,TMIN=37.)
C
        DIMENSION SCREEN(24,80), VALUE(2,2048)
C
        MAXTRE=0.
C
  1     CALL SET (SCREEN,COLMIN,COLMAX,ROWMIN,ROWMAX,TMAX,TMIN)
C
        DO 100 N=1,2048
  2       CONTINUE
CR        WRITE(6,FMT='(1X,I4,1X,A29)')
CR    &              N-1,'DATA POINTS IN THE INPUT FILE'
CR        WRITE(6,FMT='(1X)')
CR        WRITE(6,FMT='(1X,A32,A40)')
CR    &              'ENTER THE VALUES YOU WOULD LIKE ',
CR    &              'TO DISPLAY (TIME,TEMP) [999,999] TO PLOT'
CR        READ(5,*,ERR=2) VALUE(1,N),VALUE(2,N)
CR        WRITE(6,FMT='(1X)')
C
CR
CR      WRITE(6,*) ' PROCESSING VALUE ',N
CR      WRITE(6,*) '                   TIME ',VALUE(1,N)
CR      WRITE(6,*) '                   TRET ',VALUE(2,N)
CR
        IF (ABS(VALUE(1,N)-999.) .LT. 1. .AND.
     &      ABS(VALUE(2,N)-999.) .LT. 1.) THEN
          DO 5 I=N,2048
            VALUE(1,N)=0.
            VALUE(2,N)=0.
  5       CONTINUE
```

63

```fortran
C
  10        CALL PLOT (VALUE, SCREEN, TMAX, TMIN,
     &                 COLMAX, COLMIN, ROWMAX, ROWMIN)
            CALL SHOW(SCREEN)
            CALL PRBCAS(MAXTRE,CASUAL)
C
  19        WRITE(6,FMT='(1X,A37)')
     &                 'DO YOU WANT TO SAVE THIS GRAPH (Y/N)?'
            READ(5,FMT='(A1)',ERR=19) ANS
            WRITE(6,FMT='(1X)')
C
            IF (ANS .EQ. 'Y' .OR. ANS .EQ. 'y')
     &         CALL SAVE(VALUE, SCREEN, CASUAL, MAXTRE, N)
C
  20        WRITE(6,FMT='(1X,A13,2X,F6.2,A28,F6.2,A2,6X,A15)')
     &                 'CASUALTIES = ',CASUAL,
     &                 '%  THE HIGHEST CORE TEMP OF ',MAXTRE,
     &                 'oC','FINISHED (Y/N)?'
C
            READ(5,'(A1)',ERR=20) ANS
C
            IF (ANS .EQ. 'Y' .OR. ANS .EQ. 'y') THEN
              STOP
            ELSE IF (ANS .EQ. 'N' .OR. ANS .EQ. 'n') THEN
              WRITE(6,FMT='(1X,A31)')
     &                 'DO YOU WANT TO REDISPLAY (Y/N)?'
              READ(5,'(A1)',ERR=20) ANS
              IF (ANS .EQ. 'Y' .OR. ANS .EQ. 'y') THEN
                GOTO 10
              ELSE
                RETURN
              ENDIF
            ELSE
              GOTO 20
            ENDIF
          ENDIF
C
          IF (VALUE(1,N) .LT. 0. .OR.
     &        VALUE(2,N) .LT. 35. .OR. VALUE(2,N) .GT. 45.) THEN
            WRITE(6,FMT='(1X,A22,I4,A14,I4,A5,A32,A10)')
     &                 ' THE VALUE ENTERED OF ',INT(VALUE(2,N)),
     &                 ' AT A TIME OF ',INT(VALUE(1,N)),' min ',
     &                 ' IS NOT A VALID CORE TEMPERATURE',
     &                 ' (OR TIME)'
          ENDIF
        MAXTRE=MAX(MAXTRE,VALUE(2,N))
C
 100  CONTINUE
C
      RETURN
      END
C **S**
      SUBROUTINE SAVE (VALUE, SCREEN, CASUAL, MAXTRE, N)
      INTEGER I, IT, J, N
      REAL CASUAL, MAXTRE, VALUE
      CHARACTER*1 ANS, SCREEN
      CHARACTER*12 FILENAME
      CHARACTER*79 LABEL
C
      DIMENSION SCREEN(24,80), VALUE(2,2048)
C
C
```

```fortran
C  This subroutine gets a filename and a label to be placed
C      in an output file which contains the graphic output,
C      the level of casualties and the maximum core temperature,
C      and the value of core temperature at every time during
C      model execution.
C
 10     WRITE(6,FMT='(1X,A25)') 'ENTER NAME OF GRAPH FILE:'
        READ(5,FMT='(A12)',ERR=10) FILENAME
        WRITE(6,FMT='(1X)')
 11     WRITE(6,FMT='(1X,A27)') 'ENTER A LABEL FOR THE FILE:'
        READ(5,FMT='(A79)',ERR=11) LABEL
        WRITE(6,FMT='(1X)')
C
        OPEN(11,FILE=FILENAME,ERR=10)
        REWIND 11
C
        WRITE(11,FMT='(1X,A79)') LABEL
        WRITE(11,FMT='(1X)')
        DO 15 I=1,23
          WRITE(11,FMT='(1X,79A1)') (SCREEN(I,J),J=1,79)
 15     CONTINUE
C
 16     WRITE(11,FMT='(1X)')
        WRITE(11,FMT='(1X,A13,2X,F6.2,A29,F6.2,A2)')
     &                   'CASUALTIES = ',CASUAL,
     &                   '%  FOR A HIGHEST CORE TEMP OF',MAXTRE,
     &                   'oC'
        WRITE(6,FMT='(1X,A19,A36)') 'DO YOU WANT TO SAVE',
     &                   ' TEMPERATURE VS. TIME PROFILE (Y/N)?'
C
        READ(5,FMT='(A1)',ERR=16) ANS
        WRITE(6,FMT='(1X)')
C
        IF (ANS .EQ. 'y' .OR. ANS .EQ. 'Y') THEN
          WRITE(11,FMT='(1X,A10,3X,A30)')
     &                   'TIME','CORE TEMPERATURE'
          WRITE(11,FMT='(1X,A10,3X,A30)')
     &                   '----','---- -----------'
          WRITE(11,FMT='(1X)')
C
          DO 17 IT=1,N-1
            WRITE(11,FMT='(1X,F10.2,3X,F20.2)')
     &                   VALUE(1,IT),VALUE(2,IT)
 17       CONTINUE
        ENDIF
C
        CLOSE(11)
C
        RETURN
        END
C ** S **
        SUBROUTINE SCALER (TIM,SCALE)
        REAL TIM, SCALE
C
        IF (TIM .LE. 1.) THEN
          SCALE=1.
        ELSE IF (TIM .LE. 5.) THEN
          SCALE=5.
        ELSE IF (TIM .LE. 10.) THEN
          SCALE = 10.
        ELSE IF (TIM .LE. 50.) THEN
          SCALE = 50.
```

```fortran
        ELSE IF (TIM .LE. 100.) THEN
          SCALE = 100.
        ELSE IF (TIM .LE. 500.) THEN
          SCALE = 500.
        ELSE
          SCALE = TIM
        ENDIF
C
        RETURN
        END
C ** S **
        SUBROUTINE SET (SCREEN,COLMIN,COLMAX,ROWMIN,ROWMAX,TMAX,TMIN)
        INTEGER COLMIN, COLMAX, I, J, ROWMIN, ROWMAX
        REAL TMAX, TMIN
        CHARACTER*1 SCREEN, LINE
C
        DIMENSION SCREEN(24,80), LINE(3)
C
        LINE(1)='|'
        LINE(2)='-'
C
        DO 20 I=1,24
          DO 10 J=1,80
            SCREEN(I,J)=' '
  10      CONTINUE
  20    CONTINUE
C
        DO 30 I=ROWMIN,ROWMAX
          SCREEN(I,COLMIN)=LINE(1)
  30    CONTINUE
C
        DO 40 J=COLMIN,COLMAX
          SCREEN(ROWMAX,J)=LINE(2)
  40    CONTINUE
C
        SCREEN(1,8)='C'
        SCREEN(1,9)='o'
        SCREEN(1,10)='r'
        SCREEN(1,11)='e'
        SCREEN(1,13)='T'
        SCREEN(1,14)='e'
        SCREEN(1,15)='m'
        SCREEN(1,16)='p'
        SCREEN(1,17)='e'
        SCREEN(1,18)='r'
        SCREEN(1,19)='a'
        SCREEN(1,20)='t'
        SCREEN(1,21)='u'
        SCREEN(1,22)='r'
        SCREEN(1,23)='e'
        SCREEN(1,25)='('
        SCREEN(1,26)='o'
        SCREEN(1,27)='C'
        SCREEN(1,28)=')'
        SCREEN(23,36)='T'
        SCREEN(23,37)='i'
        SCREEN(23,38)='m'
        SCREEN(23,39)='e'
        SCREEN(23,41)='('
        SCREEN(23,42)='m'
        SCREEN(23,43)='i'
        SCREEN(23,44)='n'
```

66

```
      SCREEN(23,45)=')'
C
      CALL YAXIS(SCREEN, ROWMIN, ROWMAX, COLMIN, TMIN, TMAX)
C
      RETURN
      END
C ** S **
      SUBROUTINE SHOW (SCREEN)
      INTEGER I,J
      CHARACTER*1 SCREEN
C
      DIMENSION SCREEN(24,80)
C
      DO 20 I=1,23
          WRITE(6,FMT='(1X,79A1)') (SCREEN(I,J),J=1,79)
 20   CONTINUE
C
      RETURN
      END
C **T**
      SUBROUTINE TCORE(AREA, CLO, DEHYD, DIH, PATM,
     &           GAMMAC, GAMMAI, HUMID, IMCLO,
     &           METAB, WEX, SKIN, TEMPC, WIND,
     &           TREF, TAU, TLAG, PCAS, DTREFA, M,
     &           EDIF)
C****************************************************************
C     Subroutine TCORE performs all calculations required
C     to determine Equilibrium Core Temperature as a function
C     of heat stress.
C     Rate equations taken from ED-SP-75011.  Acclimatization
C     equations from W. Matthews, USARIEM, December 1989.
C     Referenced by:  Main Program
C     External Reference:  ERFCTN
C****************************************************************

      REAL A, AREA, B, C, CLO, CLOSTR, D, DEHYD, DELT, DF, DIH,
     &     DTREFA, DTREFD, EMAX, EREQ, EDIF, GAMMAC, GAMMAI,
     &     HUMID, IMCLO, IMSTR, M, MEAN, METAB, MODZ, PATM, PCAS,
     &     PS, PW, SKIN, STDDEV, T, TAU, TLAG,
     &     TEMPC, TREF, VEFF, WIND, X, XP
      DATA A,B,C,D /3.2437814, 5.86826E-3, 1.1702379E-8,
     &              2.1878462E-3 /
C
C     CALCULATE ENERGY EXPENDITURE SENSITIVE PARAMETERS
C
      M=METAB-WEX
C
C     CALCULATE WIND SPEED SENSITIVE PARAMETERS
C
      VEFF = WIND + 0.004*(METAB-105.)
      CLOSTR = CLO*VEFF**(-GAMMAC)
      IMSTR = IMCLO*VEFF**GAMMAI
CR
CR        CALCULATION OF THE SATURATION WATER PRESSURE PW
CR        AND THE VAPOR PRESSURE OVER THE SKIN PS WHEN=>
CR        T IS THE ABSOLUTE TEMPERATURE
CR        A, B, C, AND D ARE COEFFICIENTS FOR AN
CR        EMPIRICAL CALCULATION
CR        AND X AND XP ARE INTERMEDIATE VALUES.
CR
      T = TEMPC+273.16
      X = 647.27-T
```

```fortran
        XP = (X/T)*( (A+B*X+C*X**3)/(1.+D*X) )
        PW = 218.167*10**(-XP) * PATM
C
        T = SKIN+273.16
        X = 647.27-T
        XP = (X/T)*( (A+B*X+C*X**3)/(1.+D*X) )
        PS = 218.167*10**(-XP) * PATM
C
C       CALCULATE WET HEAT EXCHANGE COMPONENTS
C
        EREQ = M + 6.47*AREA*(TEMPC-SKIN)/CLOSTR
        EMAX = 14.21*AREA*IMSTR*(PS-0.01*HUMID*PW)
        EDIF= EMAX-EREQ
CR
CR        IF (EDIF .LT. 0) THEN
CR          WRITE(6,*) ' EDIF WAS FOUND TO BE ',EDIF
CR          WRITE(6,*) ' WHEN M = ',M,'   TEMPC = ',TEMPC,
CR     &                ' AND RELATIVE HUMIDITY = ',HUMID
CR        ENDIF
CR
C
CR
CR        THE COEFFICIENT FOR H(R+C)
CR        WAS ORIGINALLY .014(.0022x6.45)
CR        BUT WAS MODIFIED TO .0011x6.45 (.01095) per L. Stroschein)
CR
        TREF = 36.75 + 0.004*M +
     &        (0.0011*6.45*AREA/CLOSTR)*(TEMPC-SKIN)+
     &        0.8*EXP( 0.0047*(- EDIF ) )
C
C       CALCULATE EFFECTS OF ACCLIMATIZATION ON CORE TEMPERATURE
C
C       DTREFA = (0.5 + 1.2 * (1.0 - EXP((37.15 - TREF)/2.0)))
C     &           *(1.0 - EXP(-.005*EMAX)) * (EXP(-0.3 * DIH))
C
C
C       CALCULATE EFFECTS OF DEHYDRATION ON CORE TEMPERATURE
C               REGRESSION EQUATION BASED ON MICHAEL N. SAWKA
C               REPORT, "THERMOREGULATORY AND BLOOD RESPONSES
C               DURING EXERCISE AT GRADED HYPOHYDRATION LEVELS"
C
C
C       ***   CAUTION!!!  THE FOLLOWING EQUATIONS FOR DEHYDRATION
C       ***   ARE JUST A TEST CASE.  FURTHER INVESTIGATION IS
C       ****  BEING DONE TO VERIFY THIS ALGORITHM
C
        DTREFD = (0.1735) * DEHYD - 0.215
C
C       ***   DEHYDRATION >= 5% IS REPORTED TO COMPLETELY
C       ***   REDUCE THE EFFECT OF ACCLIMATIZATION.
C       ***   AS A RESULT, THE FOLLOWING FUNCTION IS
C       ***   BEING EVALUATED AGAINST THE DATA
C       ***   TO MODIFY THE DIH VALUE
C
        DF= MIN(1.,DEHYD/5.)
CR
CR        WRITE(6,*) ' THE VALUE OF EXP((37.15-TREF)/2) ',
CR     &                'FOR TREF=',TREF,' IS ',EXP((37.15 - TREF)/2.)
CR        WRITE(6,*) ' THE VALUE OF EXP(-.005*EMAX ',
CR     &                'FOR EMAX=',EMAX,' IS ',EXP(-.005*EMAX)
CR        WRITE(6,*) ' THE VALUE OF EXP(-0.3*DIH)',
CR     &                'FOR DIH=',DIH,' AND DF=',DF,' IS ',
```

68

```
CR      &                   EXP(-0.3*DIH*(1.-DF))
CR

        DTREFA = (0.5 + 1.2 * (1.0 - EXP((37.15 - TREF)/2.0)))
     &          *(1.0 - EXP(-.005*EMAX)) * (EXP(-0.3*DIH*(1.-DF)))

C
C       ***   THE ABOVE EQUATIONS FOR DEHYDRATION
C       ***   ARE STILL BEING TESTED FOR VALIDITY
C
C
        TREF = TREF + DTREFA + DTREFD
        DELT = TREF - 36.75
        CALL PRBCAS(TREF,PCAS)
        TAU = 0.5 + 1.5*EXP(-0.3*DELT)
        TLAG = 58./METAB
C
        RETURN
        END
C ** T **
        SUBROUTINE TRETIM (VALUE, TIME, TREF, DTREFA, M, EDIF,
     &                     EQUIL, LIMIT)
        INTEGER ENTRY, EQUIL, DELTIM, DELT, I, LAST, LASTTM,
     &          OLDTIM, START, T, TMBEG, TMEND
        REAL CPEFF, M, ED, EDIF, DELTM, DTREF, DTREFA,
     &       RISE, TDELAY, TIM, TIME,
     &       TRBEG, TREF, TREND, TRET, VALUE
        CHARACTER*1 ANS
        LOGICAL DELAY, LIMIT, NEWMET, REPEAT, REST
C
        DIMENSION VALUE(2,2048)
        DIMENSION M(128), TIME(128), TREF(128), EDIF(128)
C
        DELTIM=MAX(5,INT(TIME(EQUIL))/1024)
        OLDTIM=0
C
        WRITE(6,FMT='(1X)')
  10    IF (.NOT. LIMIT) THEN
           WRITE(6,FMT='(1X,A45,1X,I5,1X,A12)')
     &                 'DO YOU WANT TO CHANGE THE TIME INTERVAL FROM',
     &                 DELTIM,'(min)?  (Y/N)'
           READ(5,FMT='(A1)',ERR=10) ANS
           WRITE(6,FMT='(1X)')
        ENDIF
C
  20    IF (ANS .EQ. 'N' .OR. ANS .EQ. 'n'.OR. LIMIT) THEN
C
           LAST=0
           TRET=37.
           RISE=0.
           DO 30 I=1,2048
             VALUE(1,I)=0.
             VALUE(2,I)=0.
  30       CONTINUE
C
           DO 100 I=1,EQUIL
C
           NEWMET=.FALSE.
C
C   Set the rest flag if the people are not at work
C     to start a recovery period
C
           IF (M(I) .LE. 105.) THEN
```

69

```fortran
                  REST=.TRUE.
              ELSE
                  REST=.FALSE.
              ENDIF
C
C  Set the begining time for each assessment cycle
C    Use the NEWMET flag to identify a change in
C    metabolic rate.  This flag is used to assert weather
C    or not a time delay is used in calculating the change
C    in core temperature values.
C
              IF (I .EQ. 1) THEN
                  TMBEG=0
                  NEWMET=.TRUE.
              ELSE
                  TMBEG=INT(TIME(I))
                  IF (ABS(M(I)-M(I-1)) .GE. 1.) NEWMET=.TRUE.
              ENDIF
C
C  Set the time delay.  For recovery periods the time
C    delay is based on the cooling power (set by
C    the difference between Ereq and Emax.
C  The time delay for the work conditions is based on
C    the change in the level of energy expenditures
C    No time delay is generated for work at the same
C    energy expenditure.
C
              IF (REST) THEN
                  CPEFF=0.015*EDIF(I)
                  TDELAY=MIN(15.,15.*EXP(-0.5*CPEFF))
              ELSE
                  IF (I .EQ. 1) THEN
                      TDELAY=3480./M(1)
                  ELSE IF (NEWMET) THEN
                      TDELAY=3480./(105.+ABS(M(I)-M(I-1)))
                  ELSE
                      TDELAY=0.
                  ENDIF
              ENDIF
C
              TRBEG=TRET
              IF (I .LT. EQUIL) THEN
                  TREND=TREF(I)
                  TMEND=INT(TIME(I+1))
              ELSE IF (I .EQ. EQUIL) THEN
                  TREND=TREF(EQUIL)
                  TMEND=LASTTM(TMBEG, TRBEG, TREND, TDELAY,
     &                        DTREFA, CPEFF)
              ENDIF
              DTREF=TREND-TRBEG
C
              IF (TDELAY .GT. REAL(TMEND-TMBEG))
     &            WRITE(6,FMT='(1X,A11,F7.2,A22,I5,A5,
     &                          I5,A8,/,1X,A17,A30)')
     &                  'A DELAY OF ',TDELAY,
     &                  ' IS NECESSARY BETWEEN ',TMBEG,' AND ',
     &                  TMEND,' minutes','TO ACCOMPLISH THE',
     &                  ' APPROPRIATE CHANGE IN ACTIVITY'
C
CR
CR            WRITE(6,*) ' LOOPING FOR TIME # ',I
CR            WRITE(6,*) ' THE RANGE OF TIMES ARE [',TMBEG,TMEND,']'
```

70

```
CR          WRITE(6,*) ' THE RANGE OF TRES ARE [',TRBEG,TREND,']'
CR

            DELAY=.FALSE.
            REPEAT=.FALSE.
C
            IF (I .EQ. 1) THEN
               START=0
            ELSE
               START=TMBEG+1
            ENDIF
C
            IF (INT(TDELAY) .GT. 0) THEN
               DO 80 T=START,TMBEG+INT(TDELAY)
C
C     The logic that follows allows the delta in core
C     temperature, DTREF,  to vary during the delay time.
C     While the equilibrium value remains the same, the core
C     temperature calculated at any time, TRET, is modified
C     during a change in metabolic rate (from changing the
C     work load or from starting a recovery time period.
C     Note that the temperature at the delay time is always
C     calculated as long as it occurs before the end of the
C     time window being portrayed.
C
C     (Conversation with Mr. Leander Stroschein on 27 April
C     1990.)
C
               TIM=REAL(T)
               DELTM=REAL(T-TMBEG)
               DTREF=TREND-TRET
               TRBEG=TRET
               DELT=T-OLDTIM
               OLDTIM=T
C
               CALL ATTIME (TRET, TRBEG, DTREF, DTREFA, DELTM,
     &                      DELT, TDELAY, RISE, CPEFF, LAST,
     &                      TIM, VALUE, NEWMET, REST)
C
CR
CR                WRITE(6,*) ' IN LOOP 80   DELAY > 0 '
CR                WRITE(6,*) ' FOR TIME OF ',TIM
CR                WRITE(6,*) '            WITH A DELAY OF ',TDELAY
CR                WRITE(6,*) '  TRET=',TRET,' DELTA TRE = ',DTREF
CR

 80            CONTINUE
               TRBEG=TRET
            ENDIF
C
C  The DO 90 LOOP calculates the core temperature for time
C     increments of DELTIM from the end of the time delay (if
C     any, to the final time.
C
            IF (INT(TDELAY) .GT. 0) THEN
               START=TMBEG+INT(TDELAY)+1
            ELSE IF (I .EQ. 1) THEN
               START=1
            ELSE
               START=TMBEG+1
            ENDIF
C
            DO 90 T=START,TMEND,DELTIM
```

71

```fortran
C
              TIM=REAL(T)
              DELTM=REAL(T-TMBEG)
              DELT=T-OLDTIM
              OLDTIM=T
C
              CALL ATTIME (TRET, TRBEG, DTREF, DTREFA, DELTM,
     &                     DELT, TDELAY, RISE, CPEFF, LAST,
     &                     TIM, VALUE, NEWMET, REST)
C
CR
CR            WRITE(6,*) ' IN LOOP 90 '
CR            WRITE(6,*) ' BETWEEN ',START,
CR     &                 ' AND ',TMEND
CR            WRITE(6,*) ' FOR TIME OF ',TIM
CR            WRITE(6,*) '  TRET=',TRET,' DELTA TRE = ',DTREF
CR
 90           CONTINUE
C
              IF (TIM .LT. REAL(TMEND)) THEN
                DELTM=REAL(TMEND-TMBEG)
                TIM=REAL(TMEND)
                DELT=TMEND-OLDTIM
                OLDTIM=TMEND
C
                CALL ATTIME (TRET, TRBEG, DTREF, DTREFA, DELTM,
     &                       DELT, TDELAY, RISE, CPEFF, LAST,
     &                       TIM, VALUE, NEWMET, REST)
CR
CR              WRITE(6,*)
CR              WRITE(6,*) '          AT THE LAST TIME OF THE GROUP '
CR              WRITE(6,*) ' FOR TIME OF ',TIM
CR              WRITE(6,*) '  TRET=',TRET,' DELTA TRE = ',DTREF
CR
C
              ENDIF
 100        CONTINUE
          ELSE IF (ANS .EQ. 'Y' .OR. ANS .EQ. 'y') THEN
 110        WRITE(6,FMT='(1X,A39)')
     &                   'ENTER THE NEW TIME INTERVAL IN MINUTES:'
            READ(5,*,ERR=110) ENTRY
            IF (ENTRY .GT. 14400) THEN
              WRITE(6,FMT='(1X,I10,1X,A17)')
     &                     ENTRY,'GREATER THAN 1 DAY'
              WRITE(6,FMT='(1X,A16)')
     &                     'PLEASE TRY AGAIN'
              WRITE(6,FMT='(1X)')
              GOTO 110
            ELSE IF (INT(TIME(EQUIL))/DELTIM .GT. 1024) THEN
              WRITE(6,FMT='(1X,I10,1X,A31,1X,A22)')
     &                     INT(TIME(EQUIL))/DELTIM,
     &                     'TIME PERIODS REQUESTED WHEN THE',
     &                     'MAXIMUM NUMBER IS 1024'
              WRITE(6,FMT='(1X)')
              WRITE(6,FMT='(1X,A22,1X,I5)')
     &                     'TRY A TIME LARGER THAN',
     &                     INT(TIME(EQUIL))/1024
              WRITE(6,FMT='(1X)')
              GOTO 110
            ELSE
              DELTIM=ENTRY
              GOTO 10
```

```
            ENDIF
          ENDIF
C
          LAST=LAST+1
          VALUE(1,LAST)=999.
          VALUE(2,LAST)=999.
CR
CR        WRITE(6,*) ' *** THE LAST VALUE WAS ',LAST,'***'
CR
C
          RETURN
          END
C **W**
          SUBROUTINE WORK (TRET, TRE0, DTREF, DTREFA, TIME, DELAY,
        &                  RISE, DELT, NEWMET)
          INTEGER DELT
          REAL DTREF, DTREFA, DTREFC, KWRK, DELAY, OLDTRE,
        &      TRE0, TRET, TIME
          LOGICAL NEWMET
C
C   The exponential coefficient for the change of core temperature
C      during work uses the change in core temperature without the
C      benefit of acclimatization.
C
C   The time delay equation -- DELAY = 3480 / M uses the value
C      of net metabolic rate when there is a change of metabolic
C      rate and DELAY = 0 if there is no change in metabolic
C      rate.
C   Further note that during the delay time, the core temperature
C      continues to rise at 1/2 the rate per minute that it was
C      rising during the previous time period and that the maximum
C      core temperature that will be achieved will ultimately be
C      used to define the delta that will be used by the recovery
C      period.
C
C      (Conversation with Mr. Leander Stroschein on 27 April
C      1990.)
C
C
          OLDTRE=TRET
          DTREFC=MAX(0.,DTREF-DTREFA)
          KWRK=(1.+3.*EXP(-.3*(DTREFC)))/120.
CR
CR          WRITE(6,*) ' KWRK ',KWRK,'  DTREF ',DTREF,
CR        &             ' DTREFA ',DTREFA
CR
C
          IF (TIME .GT. DELAY .OR. DELAY .EQ. 0. .OR.
        &     .NOT. NEWMET) THEN
            TRET=TRE0 + DTREF*(1.-EXP(-KWRK*(TIME-DELAY)))
            IF (DELT .GT. 0) RISE=(TRET-OLDTRE)/REAL(DELT)
CR
CR          WRITE(6,*) ' IN FIRST OPTION TRET=',TRET,' RISE ',RISE
CR
          ELSE
            TRET=TRE0 + RISE*(DELAY-TIME)/DELAY +
        &               TIME/DELAY*DTREF*(1.-EXP(-KWRK))
CR
CR          WRITE(6,*) ' ',TRE0,' IN SECOND OPTION TRET= ',TRET
CR          WRITE(6,*) ' FIRST TERM= ',RISE*(DELAY-TIME)/DELAY
CR          WRITE(6,*) ' SECOND TERM=',TIME/DELAY*
```

73

```fortran
CR      &                   DTREF*(1.-EXP(-KWRK))
CR          WRITE(6,*) ' RISE= ',RISE,'  DELAY= ',DELAY,
CR      &                   ' TIME= ',TIME
CR
        ENDIF
CR
CR        WRITE(6,*) ' FOR WORKING TIME=',TIME
CR        WRITE(6,*) ' THE STARTING CORE TEMPERATURE OF   ',TRE0
CR      WRITE(6,*) ' AND THE ENDING CORE TEMPERATURE OF ',TRE0+DTREF
CR        WRITE(6,*) ' RESULTED IN A TEMPERATURE OF         ',TRET
CR        WRITE(6,*) ' WITH A RATE OF RISE OF               ',RISE
CR
        RETURN
        END
C **X**
        SUBROUTINE XAXIS (SCREEN, COLMIN, COLMAX, ROWMAX, SCALE)
        INTEGER COLMAX, COLMIN, I, ROWMAX, XTIC, XLABEL
        REAL SCALE
        CHARACTER*1 SCREEN
C
        DIMENSION SCREEN(24,80), XTIC(6), XLABEL(6)
C
C
        DO 10 I=1,6
          XTIC(I)=COLMIN + NINT((COLMAX-COLMIN)*FLOAT(I-1)/5.)
          IF (XTIC(I) .GT. COLMAX) THEN
            XTIC(I)=COLMAX
          ELSE IF (XTIC(I) .LT. COLMIN) THEN
            XTIC(I)=COLMIN
          ENDIF
C
          SCREEN(ROWMAX,XTIC(I))='+'
          XLABEL(I)=NINT(SCALE*FLOAT(I-1)/5.)
CR
CR        WRITE(6,*) ' XTIC AT ',I,XTIC(I),' SHOULD BE ',XLABEL(I)
CR
          CALL DIGIT(XTIC(I), XLABEL(I), SCREEN, ROWMAX, 'X')
 10     CONTINUE
C
        RETURN
        END
C **Y**
        SUBROUTINE YAXIS(SCREEN,ROWMIN,ROWMAX,COLMIN,TMIN,TMAX)
        INTEGER I, ROW, ROWMIN, ROWMAX, COLMIN
        REAL TMIN, TMAX, YSCALE
        CHARACTER*1 SCREEN, LINE
C
        DIMENSION SCREEN(24,80), LINE(3)
C
        LINE(3)='+'
C
        YSCALE=REAL(ROWMAX-ROWMIN)/REAL(NINT(TMAX)-INT(TMIN))
C
        DO 10 I=INT(TMIN),NINT(TMAX)
          IF (I .EQ. INT(TMIN)) THEN
            ROW=ROWMAX
          ELSE IF (I .EQ. NINT(TMAX)) THEN
            ROW=ROWMIN
          ELSE
            ROW=ROWMAX-NINT((REAL(I)-TMIN)*YSCALE)
          ENDIF
C
```

74

```
      SCREEN(ROW,COLMIN)=LINE(3)
      CALL DIGIT(COLMIN, I, SCREEN, ROW, 'Y')
C
 10   CONTINUE
C
      RETURN
      END
```

APPENDIX C
Example of Goldman-Givoni Input Files
and Resulting Outputs

The Goldman-Givoni model, as used at SAIC, was written to be an interactive model. The model gives the user a menu with which the user can set the appropriate meteorological conditions, clothing type, work intensity, etc. for a specified time period. Table C-1 shows a portion of this menu.

Table C-1. Menu Choices from Goldman-Givoni Model		
Menu Choice	Description	Default Value
1	Ambient Temperature (°C)	20
2	Relative Humidity (%)	20
3	Wind Speed (m/s)	3
4	Metabolic Rate (Watts)	105
5	External Workload	0
6	Clo	1.13
7	Im/Clo	0.43
8	Gamma for Clo	0.26
9	Gamma for Im/Clo	0.255
10	Skin Temperature (°C)	38
11	Days of Acclimatization	12
12	Dehydration (%)	0
99	Beginning Time for Conditions (Minutes)	0

The following is an example of a file used as inputs for the Goldman-Givoni model. Inputs were stored in a file and subsequently used via file redirection to facilitate more reproducible results and to minimize potential input errors. The file begins with an "I" in answer to the Goldman-Givoni question: "(I)nteractive or Metabolic (L)imit mode?" After this, the inputs are set up with a Menu Choice (number shown in table above) followed by the desired value. The case shown is for an individual in BDO4 over BDUs, unacclimatized at 2% dehydration, working at 300 Watts and implementing FM21-10 work/rest cycles.

Goldman-Givoni Input File

```
I
1
31.1
2
46.4
3
2.9
4
300
6
2.0
7
.16
8
.17
9
.25
11
0.
12
2.
99
20
4
105
99
60
4
300
99
80
4
105
99
120
4
300
99
140
4
105
99
180
4
300
99
200
4
105
99
```

240
4
300
99
260
4
105
99
300
4
300
99
320
4
105
99
360
4
300
99
380
4
105
99
420
1
35.6
2
34.1
3
4.6
4
300
99
440
4
105
99
480
4
300
99
500
4
105
99
540
4
300
99
560
4

Goldman-Givoni Input File (continued)

```
105
99
600
4
300
99
620
4
105
99
660
1
40.9
2
20.26
3
6.4
4
300
99
680
4
105
99
720
4
300
99
740
4
105
99
780
4
300
99
800
4
105
99
840
4
300
99
860
4
105
99
900
1
39.1
2
```

21.4
3
6.1
4
300
99
920
4
105
99
960
4
300
99
980
4
105
99
1020
4
300
99
1040
4
105
99
1080
4
300
99
1100
4
105
99
1140
1
34.5
2
39.13
3
3.3
4
300
99
1160
4
105
99
1200
4
300
99

```
1220
4
105
99
1260
4
300
99
1280
4
105
99
1320
4
300
99
1340
4
105
99
1380
1
31.1
2
46.4
3
2.9
4
300
99
1400
4
105
0
N
Y
02H10300.GBB
BDU+BDO4-A0D2--FM21-10 HIGHEST W/R RATIO -- WMR: 300 WATTS
Y
Y
```

Goldman-Givoni Output File

BDU+BDO4-AOD2--FM21-10 HIGHEST W/R RATIO -- WMR: 300 WATTS

```
1 +    Core Temperature (oC)
  |
  |
  |
0 +
  |
  |                          O  O OO OO O  O          OO O
  |         O  O OO O  O  O OO OO OOOO OO OOOO OO OO O OO OO OO O
39 +     OO OO O OO OO OOOOOOOOOOO OOO OO OOOOOOOOOOOOOOOO OOOOOOOOOOOO
  |    O OOOOOO OOOOOOOOOO OO OO O  O   O O   O   O OO OO O OO OO O   O O
  |   OOO OO O OO OO O                                            OO
  | O OO                                                    OO
  | O                                                         OOOOOOO
8 +OOO
  |O
  |O
  |O
  O
7 O--------------+---------------+--------------+--------------+--------------+
  0             329             659            988            1318           1647
                            Time (min)
```
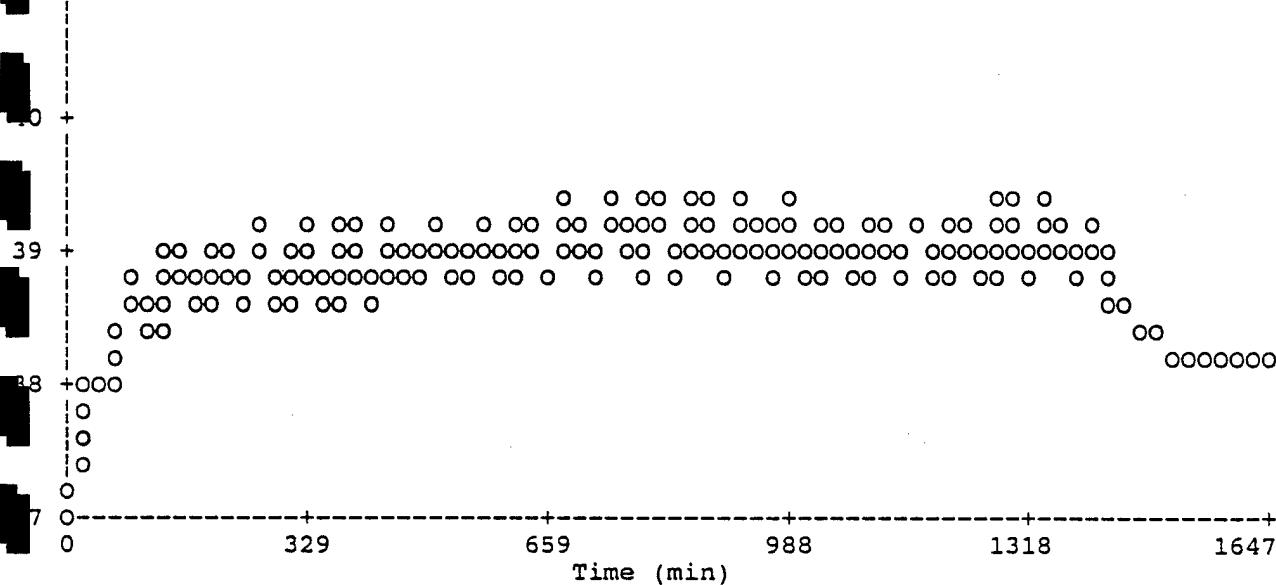
ASUALTIES =   43.40%   FOR A HIGHEST CORE TEMP OF 39.41oC

TIME	CORE TEMPERATURE
----	---- -----------
.00	37.00
1.00	37.01
2.00	37.02
3.00	37.03
4.00	37.05
5.00	37.08
6.00	37.11
7.00	37.15
8.00	37.19
9.00	37.24
10.00	37.29
11.00	37.34
12.00	37.37
17.00	37.65
20.00	37.80
21.00	37.85
22.00	37.89
23.00	37.92
24.00	37.95

25.00	37.97
26.00	37.98
27.00	37.99
28.00	37.99
33.00	38.01
38.00	38.03
43.00	38.05
48.00	38.07
53.00	38.08
58.00	38.09
60.00	38.10
61.00	38.11
62.00	38.12
63.00	38.13
64.00	38.15
65.00	38.17
66.00	38.20
67.00	38.22
68.00	38.26
69.00	38.29
70.00	38.33
71.00	38.37
72.00	38.39
77.00	38.60
80.00	38.71
81.00	38.74
82.00	38.77
83.00	38.78
84.00	38.79
85.00	38.80
86.00	38.79
87.00	38.78
88.00	38.78
93.00	38.72
98.00	38.66
103.00	38.61
108.00	38.57
113.00	38.53
118.00	38.49
120.00	38.48
121.00	38.48
122.00	38.48
123.00	38.49
124.00	38.50
125.00	38.51
126.00	38.53
127.00	38.55
128.00	38.58
129.00	38.60
130.00	38.64

131.00	38.67
132.00	38.69
137.00	38.87
140.00	38.96
141.00	38.99
142.00	39.01
143.00	39.02
144.00	39.03
145.00	39.02
146.00	39.02
147.00	39.00
148.00	38.99
153.00	38.91
158.00	38.83
163.00	38.77
168.00	38.70
173.00	38.65
178.00	38.60
180.00	38.58
181.00	38.58
182.00	38.58
183.00	38.58
184.00	38.59
185.00	38.60
186.00	38.62
187.00	38.64
188.00	38.66
189.00	38.69
190.00	38.72
191.00	38.75
192.00	38.77
197.00	38.94
200.00	39.03
201.00	39.06
202.00	39.07
203.00	39.08
204.00	39.09
205.00	39.08
206.00	39.07
207.00	39.06
208.00	39.05
213.00	38.96
218.00	38.88
223.00	38.81
228.00	38.74
233.00	38.68
238.00	38.63
240.00	38.61
241.00	38.61
242.00	38.60

243.00	38.61
244.00	38.61
245.00	38.63
246.00	38.64
247.00	38.66
248.00	38.68
249.00	38.71
250.00	38.74
251.00	38.78
252.00	38.79
257.00	38.96
260.00	39.05
261.00	39.07
262.00	39.09
263.00	39.10
264.00	39.10
265.00	39.10
266.00	39.09
267.00	39.07
268.00	39.06
273.00	38.97
278.00	38.89
283.00	38.82
288.00	38.75
293.00	38.69
298.00	38.64
300.00	38.62
301.00	38.61
302.00	38.61
303.00	38.61
304.00	38.62
305.00	38.63
306.00	38.65
307.00	38.67
308.00	38.69
309.00	38.72
310.00	38.75
311.00	38.78
312.00	38.80
317.00	38.96
320.00	39.05
321.00	39.08
322.00	39.09
323.00	39.10
324.00	39.11
325.00	39.10
326.00	39.09
327.00	39.08
328.00	39.07
333.00	38.98

338.00	38.89
343.00	38.82
348.00	38.75
353.00	38.69
358.00	38.64
360.00	38.62
361.00	38.61
362.00	38.61
363.00	38.62
364.00	38.62
365.00	38.63
366.00	38.65
367.00	38.67
368.00	38.69
369.00	38.72
370.00	38.75
371.00	38.78
372.00	38.80
377.00	38.97
380.00	39.06
381.00	39.08
382.00	39.10
383.00	39.11
384.00	39.11
385.00	39.11
386.00	39.10
387.00	39.08
388.00	39.07
393.00	38.98
398.00	38.89
403.00	38.82
408.00	38.75
413.00	38.69
418.00	38.64
420.00	38.62
421.00	38.62
422.00	38.61
423.00	38.62
424.00	38.63
425.00	38.64
426.00	38.66
427.00	38.68
428.00	38.70
429.00	38.73
430.00	38.76
431.00	38.80
432.00	38.82
437.00	39.00
440.00	39.10
441.00	39.12

Goldman-Givoni Output File (continued)

442.00	39.14
443.00	39.16
444.00	39.16
445.00	39.16
446.00	39.16
447.00	39.14
448.00	39.14
453.00	39.05
458.00	38.98
463.00	38.91
468.00	38.84
473.00	38.79
478.00	38.74
480.00	38.72
481.00	38.71
482.00	38.71
483.00	38.71
484.00	38.72
485.00	38.73
486.00	38.75
487.00	38.77
488.00	38.79
489.00	38.82
490.00	38.85
491.00	38.89
492.00	38.90
497.00	39.08
500.00	39.17
501.00	39.20
502.00	39.21
503.00	39.22
504.00	39.23
505.00	39.23
506.00	39.22
507.00	39.21
508.00	39.20
513.00	39.11
518.00	39.03
523.00	38.95
528.00	38.88
533.00	38.82
538.00	38.77
540.00	38.75
541.00	38.74
542.00	38.74
543.00	38.74
544.00	38.75
545.00	38.76
546.00	38.78
547.00	38.80

548.00	38.82
549.00	38.85
550.00	38.88
551.00	38.91
552.00	38.93
557.00	39.10
560.00	39.19
561.00	39.21
562.00	39.23
563.00	39.24
564.00	39.25
565.00	39.25
566.00	39.24
567.00	39.22
568.00	39.22
573.00	39.12
578.00	39.04
583.00	38.96
588.00	38.89
593.00	38.83
598.00	38.78
600.00	38.75
601.00	38.75
602.00	38.75
603.00	38.75
604.00	38.76
605.00	38.77
606.00	38.78
607.00	38.80
608.00	38.83
609.00	38.85
610.00	38.88
611.00	38.92
612.00	38.93
617.00	39.10
620.00	39.20
621.00	39.22
622.00	39.24
623.00	39.25
624.00	39.25
625.00	39.25
626.00	39.24
627.00	39.23
628.00	39.22
633.00	39.13
638.00	39.04
643.00	38.96
648.00	38.90
653.00	38.83
658.00	38.78

660.00	38.76
661.00	38.75
662.00	38.75
663.00	38.75
664.00	38.76
665.00	38.77
666.00	38.79
667.00	38.81
668.00	38.84
669.00	38.87
670.00	38.90
671.00	38.94
672.00	38.96
677.00	39.14
680.00	39.24
681.00	39.27
682.00	39.29
683.00	39.31
684.00	39.31
685.00	39.32
686.00	39.31
687.00	39.30
688.00	39.28
689.00	39.27
694.00	39.18
699.00	39.11
704.00	39.04
709.00	38.97
714.00	38.92
719.00	38.87
720.00	38.86
721.00	38.85
722.00	38.85
723.00	38.86
724.00	38.86
725.00	38.88
726.00	38.89
727.00	38.91
728.00	38.94
729.00	38.97
730.00	39.00
731.00	39.04
732.00	39.05
737.00	39.23
740.00	39.32
741.00	39.35
742.00	39.37
743.00	39.38
744.00	39.39
745.00	39.39

746.00	39.38
747.00	39.37
748.00	39.35
749.00	39.33
754.00	39.24
759.00	39.16
764.00	39.08
769.00	39.02
774.00	38.96
779.00	38.90
780.00	38.89
781.00	38.89
782.00	38.89
783.00	38.89
784.00	38.90
785.00	38.91
786.00	38.92
787.00	38.94
788.00	38.97
789.00	38.99
790.00	39.03
791.00	39.06
792.00	39.08
797.00	39.25
800.00	39.35
801.00	39.37
802.00	39.39
803.00	39.40
804.00	39.41
805.00	39.41
806.00	39.40
807.00	39.39
808.00	39.37
809.00	39.35
814.00	39.26
819.00	39.17
824.00	39.10
829.00	39.03
834.00	38.97
839.00	38.91
840.00	38.90
841.00	38.90
842.00	38.89
843.00	38.90
844.00	38.90
845.00	38.92
846.00	38.93
847.00	38.95
848.00	38.97
849.00	39.00

Goldman-Givoni Output File (continued)

850.00	39.03
851.00	39.07
852.00	39.08
857.00	39.26
860.00	39.35
861.00	39.38
862.00	39.40
863.00	39.41
864.00	39.41
865.00	39.41
866.00	39.41
867.00	39.39
868.00	39.37
869.00	39.36
874.00	39.26
879.00	39.18
884.00	39.10
889.00	39.03
894.00	38.97
899.00	38.92
900.00	38.90
901.00	38.90
902.00	38.90
903.00	38.90
904.00	38.90
905.00	38.91
906.00	38.93
907.00	38.95
908.00	38.97
909.00	38.99
910.00	39.02
911.00	39.06
912.00	39.07
917.00	39.23
920.00	39.32
921.00	39.34
922.00	39.36
923.00	39.37
924.00	39.37
925.00	39.36
926.00	39.35
927.00	39.33
928.00	39.31
933.00	39.21
938.00	39.12
943.00	39.04
948.00	38.97
953.00	38.90
958.00	38.84
960.00	38.82

961.00	38.81
962.00	38.81
963.00	38.81
964.00	38.82
965.00	38.83
966.00	38.85
967.00	38.87
968.00	38.89
969.00	38.92
970.00	38.95
971.00	38.98
972.00	39.00
977.00	39.17
980.00	39.26
981.00	39.28
982.00	39.30
983.00	39.31
984.00	39.31
985.00	39.30
986.00	39.29
987.00	39.27
988.00	39.26
993.00	39.16
998.00	39.08
1003.00	39.00
1008.00	38.93
1013.00	38.87
1018.00	38.82
1020.00	38.79
1021.00	38.79
1022.00	38.79
1023.00	38.79
1024.00	38.80
1025.00	38.81
1026.00	38.82
1027.00	38.84
1028.00	38.87
1029.00	38.89
1030.00	38.93
1031.00	38.96
1032.00	38.98
1037.00	39.15
1040.00	39.24
1041.00	39.27
1042.00	39.28
1043.00	39.29
1044.00	39.29
1045.00	39.29
1046.00	39.28
1047.00	39.26

1048.00	39.25
1053.00	39.15
1058.00	39.07
1063.00	38.99
1068.00	38.92
1073.00	38.86
1078.00	38.81
1080.00	38.79
1081.00	38.78
1082.00	38.78
1083.00	38.78
1084.00	38.79
1085.00	38.80
1086.00	38.82
1087.00	38.84
1088.00	38.86
1089.00	38.89
1090.00	38.92
1091.00	38.96
1092.00	38.97
1097.00	39.14
1100.00	39.24
1101.00	39.26
1102.00	39.28
1103.00	39.29
1104.00	39.29
1105.00	39.29
1106.00	39.28
1107.00	39.26
1108.00	39.24
1113.00	39.15
1118.00	39.06
1123.00	38.99
1128.00	38.92
1133.00	38.86
1138.00	38.81
1140.00	38.79
1141.00	38.78
1142.00	38.78
1143.00	38.78
1144.00	38.79
1145.00	38.80
1146.00	38.82
1147.00	38.83
1148.00	38.86
1149.00	38.89
1150.00	38.92
1151.00	38.95
1152.00	38.96
1157.00	39.14

1160.00	39.23
1161.00	39.25
1162.00	39.27
1163.00	39.28
1164.00	39.29
1165.00	39.29
1166.00	39.29
1167.00	39.28
1168.00	39.26
1169.00	39.25
1174.00	39.16
1179.00	39.08
1184.00	39.00
1189.00	38.93
1194.00	38.87
1199.00	38.81
1200.00	38.80
1201.00	38.80
1202.00	38.79
1203.00	38.80
1204.00	38.80
1205.00	38.81
1206.00	38.83
1207.00	38.85
1208.00	38.87
1209.00	38.90
1210.00	38.93
1211.00	38.96
1212.00	38.98
1217.00	39.15
1220.00	39.24
1221.00	39.26
1222.00	39.28
1223.00	39.29
1224.00	39.30
1225.00	39.30
1226.00	39.29
1227.00	39.28
1228.00	39.27
1229.00	39.26
1234.00	39.17
1239.00	39.08
1244.00	39.01
1249.00	38.94
1254.00	38.87
1259.00	38.82
1260.00	38.81
1261.00	38.80
1262.00	38.80
1263.00	38.80

1264.00	38.81
1265.00	38.82
1266.00	38.83
1267.00	38.85
1268.00	38.87
1269.00	38.90
1270.00	38.93
1271.00	38.96
1272.00	38.98
1277.00	39.15
1280.00	39.24
1281.00	39.26
1282.00	39.28
1283.00	39.29
1284.00	39.30
1285.00	39.30
1286.00	39.30
1287.00	39.29
1288.00	39.27
1289.00	39.26
1294.00	39.17
1299.00	39.08
1304.00	39.01
1309.00	38.94
1314.00	38.88
1319.00	38.82
1320.00	38.81
1321.00	38.80
1322.00	38.80
1323.00	38.80
1324.00	38.81
1325.00	38.82
1326.00	38.83
1327.00	38.85
1328.00	38.88
1329.00	38.90
1330.00	38.93
1331.00	38.97
1332.00	38.98
1337.00	39.15
1340.00	39.24
1341.00	39.26
1342.00	39.28
1343.00	39.29
1344.00	39.30
1345.00	39.30
1346.00	39.30
1347.00	39.29
1348.00	39.27
1349.00	39.26

1354.00	39.17
1359.00	39.09
1364.00	39.01
1369.00	38.94
1374.00	38.88
1379.00	38.82
1380.00	38.81
1381.00	38.80
1382.00	38.80
1383.00	38.80
1384.00	38.80
1385.00	38.81
1386.00	38.83
1387.00	38.84
1388.00	38.86
1389.00	38.89
1390.00	38.91
1391.00	38.94
1392.00	38.96
1397.00	39.11
1400.00	39.19
1401.00	39.21
1402.00	39.22
1403.00	39.23
1404.00	39.23
1405.00	39.22
1406.00	39.21
1407.00	39.19
1408.00	39.18
1413.00	39.08
1418.00	38.98
1423.00	38.90
1428.00	38.82
1433.00	38.76
1438.00	38.70
1443.00	38.64
1448.00	38.59
1453.00	38.55
1458.00	38.51
1463.00	38.48
1468.00	38.45
1473.00	38.42
1478.00	38.39
1483.00	38.37
1488.00	38.35
1493.00	38.33
1498.00	38.32
1503.00	38.30
1508.00	38.29
1513.00	38.28

1518.00	38.27
1523.00	38.26
1528.00	38.25
1533.00	38.24
1538.00	38.24
1543.00	38.23
1548.00	38.23
1553.00	38.22
1558.00	38.22
1563.00	38.21
1568.00	38.21
1573.00	38.21
1578.00	38.20
1583.00	38.20
1588.00	38.20
1593.00	38.20
1598.00	38.19
1603.00	38.19
1608.00	38.19
1613.00	38.19
1618.00	38.19
1623.00	38.19
1628.00	38.19
1633.00	38.19
1638.00	38.19
1643.00	38.18
1647.00	38.18

APPENDIX D
Comprehensive Listing of Study Results

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU	NONE	105 Watts	0%	12 days	37.10	0.00	100.00
BDU	NONE	105 Watts	0%	8 days	37.14	0.00	100.00
BDU	NONE	105 Watts	0%	4 days	37.26	0.00	100.00
BDU	NONE	105 Watts	0%	0 days	37.66	.02	99.98
BDU	NONE	105 Watts	2%	12 days	37.50	.01	99.99
BDU	NONE	105 Watts	2%	8 days	37.57	.01	99.99
BDU	NONE	105 Watts	2%	4 days	37.71	.03	99.97
BDU	NONE	105 Watts	2%	0 days	38.01	.21	99.79
BDU	NONE	105 Watts	4%	12 days	38.06	.28	99.72
BDU	NONE	105 Watts	4%	8 days	38.14	.44	99.56
BDU	NONE	105 Watts	4%	4 days	38.23	.74	99.26
BDU	NONE	105 Watts	4%	0 days	38.36	1.39	98.61
BDU	NONE	105 Watts	6%	12 days	38.70	6.28	93.72
BDU	NONE	105 Watts	6%	8 days	38.70	6.28	93.72
BDU	NONE	105 Watts	6%	4 days	38.70	6.28	93.72
BDU	NONE	105 Watts	6%	0 days	38.70	6.28	93.72
BDU	NONE	150 Watts	0%	12 days	37.30	0.00	100.00
BDU	NONE	150 Watts	0%	8 days	37.34	0.00	100.00
BDU	NONE	150 Watts	0%	4 days	37.48	.01	99.99
BDU	NONE	150 Watts	0%	0 days	37.95	.15	99.85
BDU	NONE	150 Watts	2%	12 days	37.70	.03	99.97
BDU	NONE	150 Watts	2%	8 days	37.79	.05	99.95
BDU	NONE	150 Watts	2%	4 days	37.95	.15	99.85
BDU	NONE	150 Watts	2%	0 days	38.30	1.05	98.95
BDU	NONE	150 Watts	4%	12 days	38.30	1.05	98.95
BDU	NONE	150 Watts	4%	8 days	38.39	1.64	98.36
BDU	NONE	150 Watts	4%	4 days	38.50	2.76	97.24
BDU	NONE	150 Watts	4%	0 days	38.65	5.05	94.95
BDU	NONE	150 Watts	6%	12 days	38.99	16.53	83.47
BDU	NONE	150 Watts	6%	8 days	38.99	16.53	83.47
BDU	NONE	150 Watts	6%	4 days	38.99	16.53	83.47
BDU	NONE	150 Watts	6%	0 days	38.99	16.53	83.47
BDU	NONE	300 Watts	0%	12 days	37.96	.15	99.85
BDU	NONE	300 Watts	0%	8 days	38.02	.22	99.78
BDU	NONE	300 Watts	0%	4 days	38.22	.68	99.32
BDU	NONE	300 Watts	0%	0 days	38.88	11.78	88.22
BDU	NONE	300 Watts	2%	12 days	38.39	1.62	98.38
BDU	NONE	300 Watts	2%	8 days	38.50	2.77	97.23
BDU	NONE	300 Watts	2%	4 days	38.74	7.23	92.77
BDU	NONE	300 Watts	2%	0 days	39.23	30.20	69.80
BDU	NONE	300 Watts	4%	12 days	39.09	21.44	78.56
BDU	NONE	300 Watts	4%	8 days	39.21	29.14	70.86
BDU	NONE	300 Watts	4%	4 days	39.37	40.44	59.56
BDU	NONE	300 Watts	4%	0 days	39.58	55.92	44.08
BDU	NONE	300 Watts	6%	12 days	39.92	79.29	20.71
BDU	NONE	300 Watts	6%	8 days	39.92	79.29	20.71
BDU	NONE	300 Watts	6%	4 days	39.92	79.29	20.71
BDU	NONE	300 Watts	6%	0 days	39.92	79.29	20.71
BDU	NONE	400 Watts	0%	12 days	38.43	1.98	98.02
BDU	NONE	400 Watts	0%	8 days	38.50	2.69	97.31
BDU	NONE	400 Watts	0%	4 days	38.72	6.70	93.30
BDU	NONE	400 Watts	0%	0 days	39.49	49.05	50.95
BDU	NONE	400 Watts	2%	12 days	38.87	11.31	88.69
BDU	NONE	400 Watts	2%	8 days	39.00	16.80	83.20
BDU	NONE	400 Watts	2%	4 days	39.27	32.91	67.09
BDU	NONE	400 Watts	2%	0 days	39.83	74.01	25.99
BDU	NONE	400 Watts	4%	12 days	39.62	58.91	41.09
BDU	NONE	400 Watts	4%	8 days	39.76	69.31	30.69
BDU	NONE	400 Watts	4%	4 days	39.95	80.50	19.50
BDU	NONE	400 Watts	4%	0 days	40.18	90.51	9.49
BDU	NONE	400 Watts	6%	12 days	40.53	97.61	2.39
BDU	NONE	400 Watts	6%	8 days	40.53	97.61	2.39
BDU	NONE	400 Watts	6%	4 days	40.53	97.61	2.39
BDU	NONE	400 Watts	6%	0 days	40.53	97.61	2.39

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU	NONE	500 Watts	0%	12 days	38.97	15.43	84.57
BDU	NONE	500 Watts	0%	8 days	39.05	19.15	80.85
BDU	NONE	500 Watts	0%	4 days	39.30	34.89	65.11
BDU	NONE	500 Watts	0%	0 days	40.13	88.86	11.14
BDU	NONE	500 Watts	2%	12 days	39.42	44.11	55.89
BDU	NONE	500 Watts	2%	8 days	39.57	55.23	44.77
BDU	NONE	500 Watts	2%	4 days	39.87	75.99	24.01
BDU	NONE	500 Watts	2%	0 days	40.48	97.04	2.96
BDU	NONE	500 Watts	4%	12 days	40.21	91.52	8.48
BDU	NONE	500 Watts	4%	8 days	40.37	95.33	4.67
BDU	NONE	500 Watts	4%	4 days	40.57	98.05	1.95
BDU	NONE	500 Watts	4%	0 days	40.83	99.47	.53
BDU	NONE	500 Watts	6%	12 days	41.17	99.94	.06
BDU	NONE	500 Watts	6%	8 days	41.17	99.94	.06
BDU	NONE	500 Watts	6%	4 days	41.17	99.94	.06
BDU	NONE	500 Watts	6%	0 days	41.17	99.94	.06
BDU	NONE	600 Watts	0%	12 days	39.58	55.83	44.17
BDU	NONE	600 Watts	0%	8 days	39.66	62.04	37.96
BDU	NONE	600 Watts	0%	4 days	39.94	79.88	20.12
BDU	NONE	600 Watts	0%	0 days	40.85	99.53	.47
BDU	NONE	600 Watts	2%	12 days	40.04	84.99	15.01
BDU	NONE	600 Watts	2%	8 days	40.20	91.03	8.97
BDU	NONE	600 Watts	2%	4 days	40.53	97.57	2.43
BDU	NONE	600 Watts	2%	0 days	41.20	99.95	.05
BDU	NONE	600 Watts	4%	12 days	40.87	99.59	.41
BDU	NONE	600 Watts	4%	8 days	41.05	99.85	.15
BDU	NONE	600 Watts	4%	4 days	41.27	99.97	.03
BDU	NONE	600 Watts	4%	0 days	41.55	100.00	0.00
BDU	NONE	600 Watts	6%	12 days	41.89	100.00	0.00
BDU	NONE	600 Watts	6%	8 days	41.89	100.00	0.00
BDU	NONE	600 Watts	6%	4 days	41.89	100.00	0.00
BDU	NONE	600 Watts	6%	0 days	41.89	100.00	0.00
BDU	FM 21-10	105 Watts	0%	12 days	37.10	0.00	100.00
BDU	FM 21-10	105 Watts	0%	8 days	37.14	0.00	100.00
BDU	FM 21-10	105 Watts	0%	4 days	37.26	0.00	100.00
BDU	FM 21-10	105 Watts	0%	0 days	37.66	.02	99.98
BDU	FM 21-10	105 Watts	2%	12 days	37.50	.01	99.99
BDU	FM 21-10	105 Watts	2%	8 days	37.57	.01	99.99
BDU	FM 21-10	105 Watts	2%	4 days	37.71	.03	99.97
BDU	FM 21-10	105 Watts	2%	0 days	38.01	.21	99.79
BDU	FM 21-10	105 Watts	4%	12 days	38.06	.28	99.72
BDU	FM 21-10	105 Watts	4%	8 days	38.14	.44	99.56
BDU	FM 21-10	105 Watts	4%	4 days	38.23	.74	99.26
BDU	FM 21-10	105 Watts	4%	0 days	38.36	1.39	98.61
BDU	FM 21-10	105 Watts	6%	12 days	38.70	6.28	93.72
BDU	FM 21-10	105 Watts	6%	8 days	38.70	6.28	93.72
BDU	FM 21-10	105 Watts	6%	4 days	38.70	6.28	93.72
BDU	FM 21-10	105 Watts	6%	0 days	38.70	6.28	93.72
BDU	FM 21-10	150 Watts	0%	12 days	37.26	0.00	75.00
BDU	FM 21-10	150 Watts	0%	8 days	37.30	0.00	75.00
BDU	FM 21-10	150 Watts	0%	4 days	37.44	0.00	75.00
BDU	FM 21-10	150 Watts	0%	0 days	37.90	.10	74.93
BDU	FM 21-10	150 Watts	2%	12 days	37.66	.02	74.99
BDU	FM 21-10	150 Watts	2%	8 days	37.74	.04	74.97
BDU	FM 21-10	150 Watts	2%	4 days	37.91	.11	74.92
BDU	FM 21-10	150 Watts	2%	0 days	38.24	.78	74.42
BDU	FM 21-10	150 Watts	4%	12 days	38.25	.83	74.38
BDU	FM 21-10	150 Watts	4%	8 days	38.34	1.29	74.03
BDU	FM 21-10	150 Watts	4%	4 days	38.45	2.18	73.36
BDU	FM 21-10	150 Watts	4%	0 days	38.59	4.01	71.99
BDU	FM 21-10	150 Watts	6%	12 days	38.94	13.97	64.52
BDU	FM 21-10	150 Watts	6%	8 days	38.94	13.97	64.52
BDU	FM 21-10	150 Watts	6%	4 days	38.94	13.97	64.52
BDU	FM 21-10	150 Watts	6%	0 days	38.94	13.97	64.52

101

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU	FM 21-10	300 Watts	0%	12 days	37.84	.07	74.95
BDU	FM 21-10	300 Watts	0%	8 days	37.90	.10	74.93
BDU	FM 21-10	300 Watts	0%	4 days	38.09	.34	74.75
BDU	FM 21-10	300 Watts	0%	0 days	38.73	7.00	69.75
BDU	FM 21-10	300 Watts	2%	12 days	38.27	.88	74.34
BDU	FM 21-10	300 Watts	2%	8 days	38.38	1.56	73.83
BDU	FM 21-10	300 Watts	2%	4 days	38.62	4.43	71.68
BDU	FM 21-10	300 Watts	2%	0 days	39.08	20.95	59.29
BDU	FM 21-10	300 Watts	4%	12 days	38.96	15.03	63.73
BDU	FM 21-10	300 Watts	4%	8 days	39.08	21.05	59.21
BDU	FM 21-10	300 Watts	4%	4 days	39.23	30.42	52.19
BDU	FM 21-10	300 Watts	4%	0 days	39.43	44.42	41.69
BDU	FM 21-10	300 Watts	6%	12 days	39.77	70.10	22.43
BDU	FM 21-10	300 Watts	6%	8 days	39.77	70.10	22.43
BDU	FM 21-10	300 Watts	6%	4 days	39.77	70.10	22.43
BDU	FM 21-10	300 Watts	6%	0 days	39.77	70.10	22.43
BDU	FM 21-10	400 Watts	0%	12 days	38.25	.79	74.41
BDU	FM 21-10	400 Watts	0%	8 days	38.31	1.12	74.16
BDU	FM 21-10	400 Watts	0%	4 days	38.54	3.24	72.57
BDU	FM 21-10	400 Watts	0%	0 days	39.29	34.19	49.36
BDU	FM 21-10	400 Watts	2%	12 days	38.68	5.84	70.62
BDU	FM 21-10	400 Watts	2%	8 days	38.82	9.45	67.91
BDU	FM 21-10	400 Watts	2%	4 days	39.09	21.56	58.83
BDU	FM 21-10	400 Watts	2%	0 days	39.64	60.26	29.81
BDU	FM 21-10	400 Watts	4%	12 days	39.44	45.23	41.08
BDU	FM 21-10	400 Watts	4%	8 days	39.58	56.36	32.73
BDU	FM 21-10	400 Watts	4%	4 days	39.76	69.14	23.15
BDU	FM 21-10	400 Watts	4%	0 days	39.98	82.32	13.26
BDU	FM 21-10	400 Watts	6%	12 days	40.33	94.47	4.15
BDU	FM 21-10	400 Watts	6%	8 days	40.33	94.47	4.15
BDU	FM 21-10	400 Watts	6%	4 days	40.33	94.47	4.15
BDU	FM 21-10	400 Watts	6%	0 days	40.33	94.47	4.15
BDU	FM 21-10	500 Watts	0%	12 days	38.71	6.41	70.19
BDU	FM 21-10	500 Watts	0%	8 days	38.78	8.43	68.68
BDU	FM 21-10	500 Watts	0%	4 days	39.04	18.59	61.06
BDU	FM 21-10	500 Watts	0%	0 days	39.87	76.15	17.89
BDU	FM 21-10	500 Watts	2%	12 days	39.16	25.70	55.73
BDU	FM 21-10	500 Watts	2%	8 days	39.31	35.43	48.43
BDU	FM 21-10	500 Watts	2%	4 days	39.61	58.09	31.43
BDU	FM 21-10	500 Watts	2%	0 days	40.22	91.60	6.30
BDU	FM 21-10	500 Watts	4%	12 days	39.95	80.83	14.38
BDU	FM 21-10	500 Watts	4%	8 days	40.11	88.09	8.93
BDU	FM 21-10	500 Watts	4%	4 days	40.32	94.22	4.34
BDU	FM 21-10	500 Watts	4%	0 days	40.56	97.96	1.53
BDU	FM 21-10	500 Watts	6%	12 days	40.91	99.67	.25
BDU	FM 21-10	500 Watts	6%	8 days	40.91	99.67	.25
BDU	FM 21-10	500 Watts	6%	4 days	40.91	99.67	.25
BDU	FM 21-10	500 Watts	6%	0 days	40.91	99.67	.25
BDU	FM 21-10	600 Watts	0%	12 days	39.22	29.72	52.71
BDU	FM 21-10	600 Watts	0%	8 days	39.31	35.50	48.38
BDU	FM 21-10	600 Watts	0%	4 days	39.59	56.55	32.59
BDU	FM 21-10	600 Watts	0%	0 days	40.53	97.66	1.76
BDU	FM 21-10	600 Watts	2%	12 days	39.69	63.99	27.01
BDU	FM 21-10	600 Watts	2%	8 days	39.85	74.79	18.91
BDU	FM 21-10	600 Watts	2%	4 days	40.18	90.50	7.13
BDU	FM 21-10	600 Watts	2%	0 days	40.88	99.60	.30
BDU	FM 21-10	600 Watts	4%	12 days	40.53	97.61	1.79
BDU	FM 21-10	600 Watts	4%	8 days	40.71	98.99	.76
BDU	FM 21-10	600 Watts	4%	4 days	40.93	99.71	.22
BDU	FM 21-10	600 Watts	4%	0 days	41.23	99.96	.03
BDU	FM 21-10	600 Watts	6%	12 days	41.57	100.00	0.00
BDU	FM 21-10	600 Watts	6%	8 days	41.57	100.00	0.00
BDU	FM 21-10	600 Watts	6%	4 days	41.57	100.00	0.00
BDU	FM 21-10	600 Watts	6%	0 days	41.57	100.00	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU	MET LIMIT 39oC	105 Watts	0%	12 days	37.10	0.00	100.00
BDU	MET LIMIT 39oC	105 Watts	0%	8 days	37.14	0.00	100.00
BDU	MET LIMIT 39oC	105 Watts	0%	4 days	37.26	0.00	100.00
BDU	MET LIMIT 39oC	105 Watts	0%	0 days	37.66	.02	99.98
BDU	MET LIMIT 39oC	105 Watts	2%	12 days	37.50	.01	99.99
BDU	MET LIMIT 39oC	105 Watts	2%	8 days	37.57	.01	99.99
BDU	MET LIMIT 39oC	105 Watts	2%	4 days	37.71	.03	99.97
BDU	MET LIMIT 39oC	105 Watts	2%	0 days	38.01	.21	99.79
BDU	MET LIMIT 39oC	105 Watts	4%	12 days	38.06	.28	99.72
BDU	MET LIMIT 39oC	105 Watts	4%	8 days	38.14	.44	99.56
BDU	MET LIMIT 39oC	105 Watts	4%	4 days	38.23	.74	99.26
BDU	MET LIMIT 39oC	105 Watts	4%	0 days	38.36	1.39	98.61
BDU	MET LIMIT 39oC	105 Watts	6%	12 days	38.70	6.28	93.72
BDU	MET LIMIT 39oC	105 Watts	6%	8 days	38.70	6.28	93.72
BDU	MET LIMIT 39oC	105 Watts	6%	4 days	38.70	6.28	93.72
BDU	MET LIMIT 39oC	105 Watts	6%	0 days	38.70	6.28	93.72
BDU	MET LIMIT 39oC	150 Watts	0%	12 days	37.30	0.00	100.00
BDU	MET LIMIT 39oC	150 Watts	0%	8 days	37.34	0.00	100.00
BDU	MET LIMIT 39oC	150 Watts	0%	4 days	37.48	.01	99.99
BDU	MET LIMIT 39oC	150 Watts	0%	0 days	37.95	.15	99.85
BDU	MET LIMIT 39oC	150 Watts	2%	12 days	37.70	.03	99.97
BDU	MET LIMIT 39oC	150 Watts	2%	8 days	37.79	.05	99.95
BDU	MET LIMIT 39oC	150 Watts	2%	4 days	37.95	.15	99.85
BDU	MET LIMIT 39oC	150 Watts	2%	0 days	38.30	1.05	98.95
BDU	MET LIMIT 39oC	150 Watts	4%	12 days	38.30	1.05	98.95
BDU	MET LIMIT 39oC	150 Watts	4%	8 days	38.39	1.64	98.36
BDU	MET LIMIT 39oC	150 Watts	4%	4 days	38.50	2.76	97.24
BDU	MET LIMIT 39oC	150 Watts	4%	0 days	38.65	5.05	94.95
BDU	MET LIMIT 39oC	150 Watts	6%	12 days	38.99	16.53	83.47
BDU	MET LIMIT 39oC	150 Watts	6%	8 days	38.99	16.53	83.47
BDU	MET LIMIT 39oC	150 Watts	6%	4 days	38.99	16.53	83.47
BDU	MET LIMIT 39oC	150 Watts	6%	0 days	38.99	16.53	83.47
BDU	MET LIMIT 39oC	300 Watts	0%	12 days	37.96	.15	99.85
BDU	MET LIMIT 39oC	300 Watts	0%	8 days	38.02	.22	99.78
BDU	MET LIMIT 39oC	300 Watts	0%	4 days	38.22	.68	99.32
BDU	MET LIMIT 39oC	300 Watts	0%	0 days	38.88	11.78	88.22
BDU	MET LIMIT 39oC	300 Watts	2%	12 days	38.39	1.62	98.38
BDU	MET LIMIT 39oC	300 Watts	2%	8 days	38.50	2.77	97.23
BDU	MET LIMIT 39oC	300 Watts	2%	4 days	38.74	7.23	92.77
BDU	MET LIMIT 39oC	300 Watts	2%	0 days	39.04	18.98	72.11
BDU	MET LIMIT 39oC	300 Watts	4%	12 days	39.00	16.79	80.71
BDU	MET LIMIT 39oC	300 Watts	4%	8 days	39.05	19.14	71.16
BDU	MET LIMIT 39oC	300 Watts	4%	4 days	39.05	19.16	60.63
BDU	MET LIMIT 39oC	300 Watts	4%	0 days	39.05	19.18	49.30
BDU	MET LIMIT 39oC	300 Watts	6%	12 days	39.05	19.09	27.51
BDU	MET LIMIT 39oC	300 Watts	6%	8 days	39.05	19.09	27.51
BDU	MET LIMIT 39oC	300 Watts	6%	4 days	39.05	19.09	27.51
BDU	MET LIMIT 39oC	300 Watts	6%	0 days	39.05	19.09	27.51
BDU	MET LIMIT 39oC	400 Watts	0%	12 days	38.43	1.98	98.02
BDU	MET LIMIT 39oC	400 Watts	0%	8 days	38.50	2.69	97.31
BDU	MET LIMIT 39oC	400 Watts	0%	4 days	38.72	6.70	93.30
BDU	MET LIMIT 39oC	400 Watts	0%	0 days	39.05	19.25	62.99
BDU	MET LIMIT 39oC	400 Watts	2%	12 days	38.87	11.31	88.69
BDU	MET LIMIT 39oC	400 Watts	2%	8 days	39.00	16.80	83.20
BDU	MET LIMIT 39oC	400 Watts	2%	4 days	39.04	18.86	70.59
BDU	MET LIMIT 39oC	400 Watts	2%	0 days	39.04	18.98	47.80
BDU	MET LIMIT 39oC	400 Watts	4%	12 days	39.04	18.88	52.73
BDU	MET LIMIT 39oC	400 Watts	4%	8 days	39.05	19.14	46.90
BDU	MET LIMIT 39oC	400 Watts	4%	4 days	39.05	19.16	40.42
BDU	MET LIMIT 39oC	400 Watts	4%	0 days	39.05	19.18	33.14
BDU	MET LIMIT 39oC	400 Watts	6%	12 days	39.05	19.09	17.80
BDU	MET LIMIT 39oC	400 Watts	6%	8 days	39.05	19.09	17.80
BDU	MET LIMIT 39oC	400 Watts	6%	4 days	39.05	19.09	17.80
BDU	MET LIMIT 39oC	400 Watts	6%	0 days	39.05	19.09	17.80

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU	MET LIMIT 39oC	105 Watts	0%	12 days	37.10	0.00	100.00
BDU	MET LIMIT 39oC	105 Watts	0%	8 days	37.14	0.00	100.00
BDU	MET LIMIT 39oC	105 Watts	0%	4 days	37.26	0.00	100.00
BDU	MET LIMIT 39oC	105 Watts	0%	0 days	37.66	.02	99.98
BDU	MET LIMIT 39oC	105 Watts	2%	12 days	37.50	.01	99.99
BDU	MET LIMIT 39oC	105 Watts	2%	8 days	37.57	.01	99.99
BDU	MET LIMIT 39oC	105 Watts	2%	4 days	37.71	.03	99.97
BDU	MET LIMIT 39oC	105 Watts	2%	0 days	38.01	.21	99.79
BDU	MET LIMIT 39oC	105 Watts	4%	12 days	38.06	.28	99.72
BDU	MET LIMIT 39oC	105 Watts	4%	8 days	38.14	.44	99.56
BDU	MET LIMIT 39oC	105 Watts	4%	4 days	38.23	.74	99.26
BDU	MET LIMIT 39oC	105 Watts	4%	0 days	38.36	1.39	98.61
BDU	MET LIMIT 39oC	105 Watts	6%	12 days	38.70	6.28	93.72
BDU	MET LIMIT 39oC	105 Watts	6%	8 days	38.70	6.28	93.72
BDU	MET LIMIT 39oC	105 Watts	6%	4 days	38.70	6.28	93.72
BDU	MET LIMIT 39oC	105 Watts	6%	0 days	38.70	6.28	93.72
BDU	MET LIMIT 39oC	150 Watts	0%	12 days	37.30	0.00	100.00
BDU	MET LIMIT 39oC	150 Watts	0%	8 days	37.34	0.00	100.00
BDU	MET LIMIT 39oC	150 Watts	0%	4 days	37.48	.01	99.99
BDU	MET LIMIT 39oC	150 Watts	0%	0 days	37.95	.15	99.85
BDU	MET LIMIT 39oC	150 Watts	2%	12 days	37.70	.03	99.97
BDU	MET LIMIT 39oC	150 Watts	2%	8 days	37.79	.05	99.95
BDU	MET LIMIT 39oC	150 Watts	2%	4 days	37.95	.15	99.85
BDU	MET LIMIT 39oC	150 Watts	2%	0 days	38.30	1.05	98.95
BDU	MET LIMIT 39oC	150 Watts	4%	12 days	38.30	1.05	98.95
BDU	MET LIMIT 39oC	150 Watts	4%	8 days	38.39	1.64	98.36
BDU	MET LIMIT 39oC	150 Watts	4%	4 days	38.50	2.76	97.24
BDU	MET LIMIT 39oC	150 Watts	4%	0 days	38.65	5.05	94.95
BDU	MET LIMIT 39oC	150 Watts	6%	12 days	38.99	16.53	83.47
BDU	MET LIMIT 39oC	150 Watts	6%	8 days	38.99	16.53	83.47
BDU	MET LIMIT 39oC	150 Watts	6%	4 days	38.99	16.53	83.47
BDU	MET LIMIT 39oC	150 Watts	6%	0 days	38.99	16.53	83.47
BDU	MET LIMIT 39oC	300 Watts	0%	12 days	37.96	.15	99.85
BDU	MET LIMIT 39oC	300 Watts	0%	8 days	38.02	.22	99.78
BDU	MET LIMIT 39oC	300 Watts	0%	4 days	38.22	.68	99.32
BDU	MET LIMIT 39oC	300 Watts	0%	0 days	38.88	11.78	88.22
BDU	MET LIMIT 39oC	300 Watts	2%	12 days	38.39	1.62	98.38
BDU	MET LIMIT 39oC	300 Watts	2%	8 days	38.50	2.77	97.23
BDU	MET LIMIT 39oC	300 Watts	2%	4 days	38.74	7.23	92.77
BDU	MET LIMIT 39oC	300 Watts	2%	0 days	39.04	18.98	72.11
BDU	MET LIMIT 39oC	300 Watts	4%	12 days	39.00	16.79	80.71
BDU	MET LIMIT 39oC	300 Watts	4%	8 days	39.05	19.14	71.16
BDU	MET LIMIT 39oC	300 Watts	4%	4 days	39.05	19.16	60.63
BDU	MET LIMIT 39oC	300 Watts	4%	0 days	39.05	19.18	49.30
BDU	MET LIMIT 39oC	300 Watts	6%	12 days	39.05	19.09	27.51
BDU	MET LIMIT 39oC	300 Watts	6%	8 days	39.05	19.09	27.51
BDU	MET LIMIT 39oC	300 Watts	6%	4 days	39.05	19.09	27.51
BDU	MET LIMIT 39oC	300 Watts	6%	0 days	39.05	19.09	27.51
BDU	MET LIMIT 39oC	400 Watts	0%	12 days	38.43	1.98	98.02
BDU	MET LIMIT 39oC	400 Watts	0%	8 days	38.50	2.69	97.31
BDU	MET LIMIT 39oC	400 Watts	0%	4 days	38.72	6.70	93.30
BDU	MET LIMIT 39oC	400 Watts	0%	0 days	39.05	19.25	62.99
BDU	MET LIMIT 39oC	400 Watts	2%	12 days	38.87	11.31	88.69
BDU	MET LIMIT 39oC	400 Watts	2%	8 days	39.00	16.80	83.20
BDU	MET LIMIT 39oC	400 Watts	2%	4 days	39.04	18.86	70.59
BDU	MET LIMIT 39oC	400 Watts	2%	0 days	39.04	18.98	47.80
BDU	MET LIMIT 39oC	400 Watts	4%	12 days	39.04	18.88	52.73
BDU	MET LIMIT 39oC	400 Watts	4%	8 days	39.05	19.14	46.90
BDU	MET LIMIT 39oC	400 Watts	4%	4 days	39.05	19.16	40.42
BDU	MET LIMIT 39oC	400 Watts	4%	0 days	39.05	19.18	33.14
BDU	MET LIMIT 39oC	400 Watts	6%	12 days	39.05	19.09	17.80
BDU	MET LIMIT 39oC	400 Watts	6%	8 days	39.05	19.09	17.80
BDU	MET LIMIT 39oC	400 Watts	6%	4 days	39.05	19.09	17.80
BDU	MET LIMIT 39oC	400 Watts	6%	0 days	39.05	19.09	17.80

103

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU	MET LIMIT 39oC	500 Watts	0%	12 days	38.97	15.43	84.57
BDU	MET LIMIT 39oC	500 Watts	0%	8 days	39.00	16.92	83.08
BDU	MET LIMIT 39oC	500 Watts	0%	4 days	39.05	19.07	73.65
BDU	MET LIMIT 39oC	500 Watts	0%	0 days	39.05	19.25	46.84
BDU	MET LIMIT 39oC	500 Watts	2%	12 days	39.04	18.59	68.38
BDU	MET LIMIT 39oC	500 Watts	2%	8 days	39.04	19.02	63.16
BDU	MET LIMIT 39oC	500 Watts	2%	4 days	39.04	18.86	52.74
BDU	MET LIMIT 39oC	500 Watts	2%	0 days	39.04	18.98	35.65
BDU	MET LIMIT 39oC	500 Watts	4%	12 days	39.04	18.88	39.75
BDU	MET LIMIT 39oC	500 Watts	4%	8 days	39.05	19.14	35.58
BDU	MET LIMIT 39oC	500 Watts	4%	4 days	39.05	19.16	29.91
BDU	MET LIMIT 39oC	500 Watts	4%	0 days	39.05	19.18	24.25
BDU	MET LIMIT 39oC	500 Watts	6%	12 days	39.05	19.09	13.75
BDU	MET LIMIT 39oC	500 Watts	6%	8 days	39.05	19.09	13.75
BDU	MET LIMIT 39oC	500 Watts	6%	4 days	39.05	19.09	13.75
BDU	MET LIMIT 39oC	500 Watts	6%	0 days	39.05	19.09	13.75
BDU	MET LIMIT 39oC	600 Watts	0%	12 days	38.97	15.43	71.88
BDU	MET LIMIT 39oC	600 Watts	0%	8 days	39.00	16.92	68.13
BDU	MET LIMIT 39oC	600 Watts	0%	4 days	39.05	19.07	58.27
BDU	MET LIMIT 39oC	600 Watts	0%	0 days	39.05	19.25	37.95
BDU	MET LIMIT 39oC	600 Watts	2%	12 days	39.04	18.59	54.54
BDU	MET LIMIT 39oC	600 Watts	2%	8 days	39.04	19.02	50.21
BDU	MET LIMIT 39oC	600 Watts	2%	4 days	39.04	18.86	42.19
BDU	MET LIMIT 39oC	600 Watts	2%	0 days	39.04	18.98	28.36
BDU	MET LIMIT 39oC	600 Watts	4%	12 days	39.04	18.88	31.64
BDU	MET LIMIT 39oC	600 Watts	4%	8 days	39.05	19.14	28.30
BDU	MET LIMIT 39oC	600 Watts	4%	4 days	39.05	19.16	24.25
BDU	MET LIMIT 39oC	600 Watts	4%	0 days	39.05	19.18	19.40
BDU	MET LIMIT 39oC	600 Watts	6%	12 days	39.05	19.09	10.52
BDU	MET LIMIT 39oC	600 Watts	6%	8 days	39.05	19.09	10.52
BDU	MET LIMIT 39oC	600 Watts	6%	4 days	39.05	19.09	10.52
BDU	MET LIMIT 39oC	600 Watts	6%	0 days	39.05	19.09	10.52
BDU	MET LIMIT 38.5oC	105 Watts	0%	12 days	37.10	0.00	100.00
BDU	MET LIMIT 38.5oC	105 Watts	0%	8 days	37.14	0.00	100.00
BDU	MET LIMIT 38.5oC	105 Watts	0%	4 days	37.26	0.00	100.00
BDU	MET LIMIT 38.5oC	105 Watts	0%	0 days	37.66	.02	99.98
BDU	MET LIMIT 38.5oC	105 Watts	2%	12 days	37.50	.01	99.99
BDU	MET LIMIT 38.5oC	105 Watts	2%	8 days	37.57	.01	99.99
BDU	MET LIMIT 38.5oC	105 Watts	2%	4 days	37.71	.03	99.97
BDU	MET LIMIT 38.5oC	105 Watts	2%	0 days	38.01	.21	99.79
BDU	MET LIMIT 38.5oC	105 Watts	4%	12 days	38.06	.28	99.72
BDU	MET LIMIT 38.5oC	105 Watts	4%	8 days	38.14	.44	99.56
BDU	MET LIMIT 38.5oC	105 Watts	4%	4 days	38.23	.74	99.26
BDU	MET LIMIT 38.5oC	105 Watts	4%	0 days	38.36	1.39	98.61
BDU	MET LIMIT 38.5oC	105 Watts	6%	12 days	38.70	6.28	93.72
BDU	MET LIMIT 38.5oC	105 Watts	6%	8 days	38.70	6.28	93.72
BDU	MET LIMIT 38.5oC	105 Watts	6%	4 days	38.70	6.28	93.72
BDU	MET LIMIT 38.5oC	105 Watts	6%	0 days	38.70	6.28	93.72
BDU	MET LIMIT 38.5oC	150 Watts	0%	12 days	37.30	0.00	100.00
BDU	MET LIMIT 38.5oC	150 Watts	0%	8 days	37.34	0.00	100.00
BDU	MET LIMIT 38.5oC	150 Watts	0%	4 days	37.48	.01	99.99
BDU	MET LIMIT 38.5oC	150 Watts	0%	0 days	37.95	.15	99.85
BDU	MET LIMIT 38.5oC	150 Watts	2%	12 days	37.70	.02	99.98
BDU	MET LIMIT 38.5oC	150 Watts	2%	8 days	37.79	.05	99.95
BDU	MET LIMIT 38.5oC	150 Watts	2%	4 days	37.95	.15	99.85
BDU	MET LIMIT 38.5oC	150 Watts	2%	0 days	38.30	1.05	98.95
BDU	MET LIMIT 38.5oC	150 Watts	4%	12 days	38.30	1.05	98.95
BDU	MET LIMIT 38.5oC	150 Watts	4%	8 days	38.39	1.64	98.36
BDU	MET LIMIT 38.5oC	150 Watts	4%	4 days	38.50	2.71	97.29
BDU	MET LIMIT 38.5oC	150 Watts	4%	0 days	38.50	2.74	81.70
BDU	MET LIMIT 38.5oC	150 Watts	6%	12 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	150 Watts	6%	8 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	150 Watts	6%	4 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	150 Watts	6%	0 days	38.70	6.28	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU	MET LIMIT 38.5oC	300 Watts	0%	12 days	37.96	.15	99.85
BDU	MET LIMIT 38.5oC	300 Watts	0%	8 days	38.02	.22	99.78
BDU	MET LIMIT 38.5oC	300 Watts	0%	4 days	38.22	.68	99.32
BDU	MET LIMIT 38.5oC	300 Watts	0%	0 days	38.54	3.18	74.55
BDU	MET LIMIT 38.5oC	300 Watts	2%	12 days	38.39	1.62	98.38
BDU	MET LIMIT 38.5oC	300 Watts	2%	8 days	38.50	2.77	97.23
BDU	MET LIMIT 38.5oC	300 Watts	2%	4 days	38.53	3.15	82.32
BDU	MET LIMIT 38.5oC	300 Watts	2%	0 days	38.54	3.21	47.43
BDU	MET LIMIT 38.5oC	300 Watts	4%	12 days	38.53	3.13	43.59
BDU	MET LIMIT 38.5oC	300 Watts	4%	8 days	38.53	3.13	40.69
BDU	MET LIMIT 38.5oC	300 Watts	4%	4 days	38.53	3.14	31.00
BDU	MET LIMIT 38.5oC	300 Watts	4%	0 days	38.53	3.15	20.34
BDU	MET LIMIT 38.5oC	300 Watts	6%	12 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	300 Watts	6%	8 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	300 Watts	6%	4 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	300 Watts	6%	0 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	400 Watts	0%	12 days	38.43	1.98	98.02
BDU	MET LIMIT 38.5oC	400 Watts	0%	8 days	38.50	2.69	97.31
BDU	MET LIMIT 38.5oC	400 Watts	0%	4 days	38.53	3.15	86.20
BDU	MET LIMIT 38.5oC	400 Watts	0%	0 days	38.54	3.18	49.38
BDU	MET LIMIT 38.5oC	400 Watts	2%	12 days	38.53	3.11	75.57
BDU	MET LIMIT 38.5oC	400 Watts	2%	8 days	38.53	3.14	67.80
BDU	MET LIMIT 38.5oC	400 Watts	2%	4 days	38.53	3.15	54.24
BDU	MET LIMIT 38.5oC	400 Watts	2%	0 days	38.54	3.21	31.94
BDU	MET LIMIT 38.5oC	400 Watts	4%	12 days	38.53	3.13	29.06
BDU	MET LIMIT 38.5oC	400 Watts	4%	8 days	38.53	3.13	27.12
BDU	MET LIMIT 38.5oC	400 Watts	4%	4 days	38.53	3.14	20.34
BDU	MET LIMIT 38.5oC	400 Watts	4%	0 days	38.53	3.15	13.56
BDU	MET LIMIT 38.5oC	400 Watts	6%	12 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	400 Watts	6%	8 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	400 Watts	6%	4 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	400 Watts	6%	0 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	500 Watts	0%	12 days	38.53	3.13	78.46
BDU	MET LIMIT 38.5oC	500 Watts	0%	8 days	38.53	3.15	75.54
BDU	MET LIMIT 38.5oC	500 Watts	0%	4 days	38.53	3.15	64.89
BDU	MET LIMIT 38.5oC	500 Watts	0%	0 days	38.54	3.18	36.79
BDU	MET LIMIT 38.5oC	500 Watts	2%	12 days	38.53	3.11	57.17
BDU	MET LIMIT 38.5oC	500 Watts	2%	8 days	38.53	3.14	51.34
BDU	MET LIMIT 38.5oC	500 Watts	2%	4 days	38.53	3.15	40.68
BDU	MET LIMIT 38.5oC	500 Watts	2%	0 days	38.54	3.21	23.23
BDU	MET LIMIT 38.5oC	500 Watts	4%	12 days	38.53	3.13	21.31
BDU	MET LIMIT 38.5oC	500 Watts	4%	8 days	38.53	3.13	20.34
BDU	MET LIMIT 38.5oC	500 Watts	4%	4 days	38.53	3.14	15.50
BDU	MET LIMIT 38.5oC	500 Watts	4%	0 days	38.53	3.15	10.65
BDU	MET LIMIT 38.5oC	500 Watts	6%	12 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	500 Watts	6%	8 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	500 Watts	6%	4 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	500 Watts	6%	0 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	600 Watts	0%	12 days	38.53	3.13	62.97
BDU	MET LIMIT 38.5oC	600 Watts	0%	8 days	38.53	3.15	60.05
BDU	MET LIMIT 38.5oC	600 Watts	0%	4 days	38.53	3.15	51.33
BDU	MET LIMIT 38.5oC	600 Watts	0%	0 days	38.54	3.18	29.05
BDU	MET LIMIT 38.5oC	600 Watts	2%	12 days	38.53	3.11	45.54
BDU	MET LIMIT 38.5oC	600 Watts	2%	8 days	38.53	3.14	40.68
BDU	MET LIMIT 38.5oC	600 Watts	2%	4 days	38.53	3.15	31.96
BDU	MET LIMIT 38.5oC	600 Watts	2%	0 days	38.54	3.21	18.39
BDU	MET LIMIT 38.5oC	600 Watts	4%	12 days	38.53	3.13	17.44
BDU	MET LIMIT 38.5oC	600 Watts	4%	8 days	38.53	3.13	16.47
BDU	MET LIMIT 38.5oC	600 Watts	4%	4 days	38.53	3.14	12.59
BDU	MET LIMIT 38.5oC	600 Watts	4%	0 days	38.53	3.15	7.75
BDU	MET LIMIT 38.5oC	600 Watts	6%	12 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	600 Watts	6%	8 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	600 Watts	6%	4 days	38.70	6.28	0.00
BDU	MET LIMIT 38.5oC	600 Watts	6%	0 days	38.70	6.28	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU	MET LIMIT 38oC	105 Watts	0%	12 days	37.10	0.00	100.00
BDU	MET LIMIT 38oC	105 Watts	0%	8 days	37.14	0.00	100.00
BDU	MET LIMIT 38oC	105 Watts	0%	4 days	37.26	0.00	100.00
BDU	MET LIMIT 38oC	105 Watts	0%	0 days	37.66	.02	99.98
BDU	MET LIMIT 38oC	105 Watts	2%	12 days	37.50	.01	99.99
BDU	MET LIMIT 38oC	105 Watts	2%	8 days	37.57	.01	99.99
BDU	MET LIMIT 38oC	105 Watts	2%	4 days	37.71	.03	99.97
BDU	MET LIMIT 38oC	105 Watts	2%	0 days	38.01	.21	99.79
BDU	MET LIMIT 38oC	105 Watts	4%	12 days	38.06	.28	99.72
BDU	MET LIMIT 38oC	105 Watts	4%	8 days	38.14	.44	99.56
BDU	MET LIMIT 38oC	105 Watts	4%	4 days	38.23	.74	99.26
BDU	MET LIMIT 38oC	105 Watts	4%	0 days	38.36	1.39	98.61
BDU	MET LIMIT 38oC	105 Watts	6%	12 days	38.70	6.28	93.72
BDU	MET LIMIT 38oC	105 Watts	6%	8 days	38.70	6.28	93.72
BDU	MET LIMIT 38oC	105 Watts	6%	4 days	38.70	6.28	93.72
BDU	MET LIMIT 38oC	105 Watts	6%	0 days	38.70	6.28	93.72
BDU	MET LIMIT 38oC	150 Watts	0%	12 days	37.30	0.00	100.00
BDU	MET LIMIT 38oC	150 Watts	0%	8 days	37.34	0.00	100.00
BDU	MET LIMIT 38oC	150 Watts	0%	4 days	37.48	.01	99.99
BDU	MET LIMIT 38oC	150 Watts	0%	0 days	37.95	.15	99.85
BDU	MET LIMIT 38oC	150 Watts	2%	12 days	37.70	.03	99.97
BDU	MET LIMIT 38oC	150 Watts	2%	8 days	37.79	.05	99.95
BDU	MET LIMIT 38oC	150 Watts	2%	4 days	37.95	.15	99.85
BDU	MET LIMIT 38oC	150 Watts	2%	0 days	38.02	.22	39.91
BDU	MET LIMIT 38oC	150 Watts	4%	12 days	38.03	.24	19.95
BDU	MET LIMIT 38oC	150 Watts	4%	8 days	38.14	.44	0.00
BDU	MET LIMIT 38oC	150 Watts	4%	4 days	38.23	.74	0.00
BDU	MET LIMIT 38oC	150 Watts	4%	0 days	38.36	1.39	0.00
BDU	MET LIMIT 38oC	150 Watts	6%	12 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	150 Watts	6%	8 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	150 Watts	6%	4 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	150 Watts	6%	0 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	300 Watts	0%	12 days	37.96	.15	99.85
BDU	MET LIMIT 38oC	300 Watts	0%	8 days	38.00	.20	99.80
BDU	MET LIMIT 38oC	300 Watts	0%	4 days	38.03	.23	84.80
BDU	MET LIMIT 38oC	300 Watts	0%	0 days	38.03	.23	36.91
BDU	MET LIMIT 38oC	300 Watts	2%	12 days	38.02	.22	63.86
BDU	MET LIMIT 38oC	300 Watts	2%	8 days	38.02	.22	53.88
BDU	MET LIMIT 38oC	300 Watts	2%	4 days	38.03	.23	36.91
BDU	MET LIMIT 38oC	300 Watts	2%	0 days	38.02	.22	8.98
BDU	MET LIMIT 38oC	300 Watts	4%	12 days	38.03	.24	4.99
BDU	MET LIMIT 38oC	300 Watts	4%	8 days	38.14	.44	0.00
BDU	MET LIMIT 38oC	300 Watts	4%	4 days	38.23	.74	0.00
BDU	MET LIMIT 38oC	300 Watts	4%	0 days	38.36	1.39	0.00
BDU	MET LIMIT 38oC	300 Watts	6%	12 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	300 Watts	6%	8 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	300 Watts	6%	4 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	300 Watts	6%	0 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	400 Watts	0%	12 days	38.02	.23	73.83
BDU	MET LIMIT 38oC	400 Watts	0%	8 days	38.02	.23	68.84
BDU	MET LIMIT 38oC	400 Watts	0%	4 days	38.03	.23	55.87
BDU	MET LIMIT 38oC	400 Watts	0%	0 days	38.03	.23	23.94
BDU	MET LIMIT 38oC	400 Watts	2%	12 days	38.02	.22	42.91
BDU	MET LIMIT 38oC	400 Watts	2%	8 days	38.02	.22	35.92
BDU	MET LIMIT 38oC	400 Watts	2%	4 days	38.03	.23	23.94
BDU	MET LIMIT 38oC	400 Watts	2%	0 days	38.02	.22	5.99
BDU	MET LIMIT 38oC	400 Watts	4%	12 days	38.03	.24	2.99
BDU	MET LIMIT 38oC	400 Watts	4%	8 days	38.14	.44	0.00
BDU	MET LIMIT 38oC	400 Watts	4%	4 days	38.23	.74	0.00
BDU	MET LIMIT 38oC	400 Watts	4%	0 days	38.36	1.39	0.00
BDU	MET LIMIT 38oC	400 Watts	6%	12 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	400 Watts	6%	8 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	400 Watts	6%	4 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	400 Watts	6%	0 days	38.70	6.28	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU	MET LIMIT 38oC	500 Watts	0%	12 days	38.02	.23	54.87
BDU	MET LIMIT 38oC	500 Watts	0%	8 days	38.02	.23	51.88
BDU	MET LIMIT 38oC	500 Watts	0%	4 days	38.03	.23	41.90
BDU	MET LIMIT 38oC	500 Watts	0%	0 days	38.03	.23	17.96
BDU	MET LIMIT 38oC	500 Watts	2%	12 days	38.02	.22	31.93
BDU	MET LIMIT 38oC	500 Watts	2%	8 days	38.02	.22	26.94
BDU	MET LIMIT 38oC	500 Watts	2%	4 days	38.03	.23	17.96
BDU	MET LIMIT 38oC	500 Watts	2%	0 days	38.02	.22	4.99
BDU	MET LIMIT 38oC	500 Watts	4%	12 days	38.03	.24	2.00
BDU	MET LIMIT 38oC	500 Watts	4%	8 days	38.14	.44	0.00
BDU	MET LIMIT 38oC	500 Watts	4%	4 days	38.23	.74	0.00
BDU	MET LIMIT 38oC	500 Watts	4%	0 days	38.36	1.39	0.00
BDU	MET LIMIT 38oC	500 Watts	6%	12 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	500 Watts	6%	8 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	500 Watts	6%	4 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	500 Watts	6%	0 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	600 Watts	0%	12 days	38.02	.23	43.90
BDU	MET LIMIT 38oC	600 Watts	0%	8 days	38.02	.23	40.91
BDU	MET LIMIT 38oC	600 Watts	0%	4 days	38.03	.23	33.92
BDU	MET LIMIT 38oC	600 Watts	0%	0 days	38.03	.23	13.97
BDU	MET LIMIT 38oC	600 Watts	2%	12 days	38.02	.22	24.95
BDU	MET LIMIT 38oC	600 Watts	2%	8 days	38.02	.23	20.95
BDU	MET LIMIT 38oC	600 Watts	2%	4 days	38.03	.23	14.97
BDU	MET LIMIT 38oC	600 Watts	2%	0 days	38.01	.21	3.99
BDU	MET LIMIT 38oC	600 Watts	4%	12 days	38.06	.28	1.99
BDU	MET LIMIT 38oC	600 Watts	4%	8 days	38.14	.44	0.00
BDU	MET LIMIT 38oC	600 Watts	4%	4 days	38.23	.74	0.00
BDU	MET LIMIT 38oC	600 Watts	4%	0 days	38.36	1.39	0.00
BDU	MET LIMIT 38oC	600 Watts	6%	12 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	600 Watts	6%	8 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	600 Watts	6%	4 days	38.70	6.28	0.00
BDU	MET LIMIT 38oC	600 Watts	6%	0 days	38.70	6.28	0.00
BDU	FM 21-40	105 Watts	0%	12 days	37.10	0.00	100.00
BDU	FM 21-40	105 Watts	0%	8 days	37.14	0.00	100.00
BDU	FM 21-40	105 Watts	0%	4 days	37.26	0.00	100.00
BDU	FM 21-40	105 Watts	0%	0 days	37.66	.02	99.98
BDU	FM 21-40	105 Watts	2%	12 days	37.50	.01	99.99
BDU	FM 21-40	105 Watts	2%	8 days	37.57	.01	99.99
BDU	FM 21-40	105 Watts	2%	4 days	37.71	.03	99.97
BDU	FM 21-40	105 Watts	2%	0 days	38.01	.21	99.79
BDU	FM 21-40	105 Watts	4%	12 days	38.06	.28	99.72
BDU	FM 21-40	105 Watts	4%	8 days	38.14	.44	99.56
BDU	FM 21-40	105 Watts	4%	4 days	38.23	.74	99.26
BDU	FM 21-40	105 Watts	4%	0 days	38.36	1.39	98.61
BDU	FM 21-40	105 Watts	6%	12 days	38.70	6.28	93.72
BDU	FM 21-40	105 Watts	6%	8 days	38.70	6.28	93.72
BDU	FM 21-40	105 Watts	6%	4 days	38.70	6.28	93.72
BDU	FM 21-40	105 Watts	6%	0 days	38.70	6.28	93.72
BDU	FM 21-40	150 Watts	0%	12 days	37.30	0.00	100.00
BDU	FM 21-40	150 Watts	0%	8 days	37.34	0.00	100.00
BDU	FM 21-40	150 Watts	0%	4 days	37.48	.01	99.99
BDU	FM 21-40	150 Watts	0%	0 days	37.95	.15	99.85
BDU	FM 21-40	150 Watts	2%	12 days	37.70	.03	99.97
BDU	FM 21-40	150 Watts	2%	8 days	37.79	.05	99.95
BDU	FM 21-40	150 Watts	2%	4 days	37.95	.15	99.85
BDU	FM 21-40	150 Watts	2%	0 days	38.30	1.05	98.95
BDU	FM 21-40	150 Watts	4%	12 days	38.30	1.05	98.95
BDU	FM 21-40	150 Watts	4%	8 days	38.39	1.64	98.36
BDU	FM 21-40	150 Watts	4%	4 days	38.50	2.76	97.24
BDU	FM 21-40	150 Watts	4%	0 days	38.65	5.05	94.95
BDU	FM 21-40	150 Watts	6%	12 days	38.99	16.53	83.47
BDU	FM 21-40	150 Watts	6%	8 days	38.99	16.53	83.47
BDU	FM 21-40	150 Watts	6%	4 days	38.99	16.53	83.47
BDU	FM 21-40	150 Watts	6%	0 days	38.99	16.53	83.47

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU	FM 21-40	300 Watts	0%	12 days	37.71	.03	43.99
BDU	FM 21-40	300 Watts	0%	8 days	37.76	.04	43.98
BDU	FM 21-40	300 Watts	0%	4 days	37.95	.14	43.94
BDU	FM 21-40	300 Watts	0%	0 days	38.58	3.82	42.32
BDU	FM 21-40	300 Watts	2%	12 days	38.13	.42	43.82
BDU	FM 21-40	300 Watts	2%	8 days	38.24	.76	43.67
BDU	FM 21-40	300 Watts	2%	4 days	38.46	2.28	43.00
BDU	FM 21-40	300 Watts	2%	0 days	38.93	13.47	38.07
BDU	FM 21-40	300 Watts	4%	12 days	38.81	9.17	39.97
BDU	FM 21-40	300 Watts	4%	8 days	38.93	13.52	38.05
BDU	FM 21-40	300 Watts	4%	4 days	39.08	20.92	34.80
BDU	FM 21-40	300 Watts	4%	0 days	39.27	33.10	29.44
BDU	FM 21-40	300 Watts	6%	12 days	39.62	59.12	17.99
BDU	FM 21-40	300 Watts	6%	8 days	39.62	59.12	17.99
BDU	FM 21-40	300 Watts	6%	4 days	39.62	59.12	17.99
BDU	FM 21-40	300 Watts	6%	0 days	39.62	59.12	17.99
BDU	FM 21-40	400 Watts	0%	12 days	38.06	.28	43.88
BDU	FM 21-40	400 Watts	0%	8 days	38.12	.40	43.82
BDU	FM 21-40	400 Watts	0%	4 days	38.33	1.24	43.45
BDU	FM 21-40	400 Watts	0%	0 days	39.05	19.54	35.40
BDU	FM 21-40	400 Watts	2%	12 days	38.49	2.63	42.84
BDU	FM 21-40	400 Watts	2%	8 days	38.61	4.43	42.05
BDU	FM 21-40	400 Watts	2%	4 days	38.87	11.23	39.06
BDU	FM 21-40	400 Watts	2%	0 days	39.40	42.44	25.33
BDU	FM 21-40	400 Watts	4%	12 days	39.22	29.23	31.14
BDU	FM 21-40	400 Watts	4%	8 days	39.35	38.75	26.95
BDU	FM 21-40	400 Watts	4%	4 days	39.52	51.92	21.16
BDU	FM 21-40	400 Watts	4%	0 days	39.75	68.33	13.93
BDU	FM 21-40	400 Watts	6%	12 days	40.09	87.38	5.55
BDU	FM 21-40	400 Watts	6%	8 days	40.09	87.38	5.55
BDU	FM 21-40	400 Watts	6%	4 days	40.09	87.38	5.55
BDU	FM 21-40	400 Watts	6%	0 days	40.09	87.38	5.55
BDU	FM 21-40	500 Watts	0%	12 days	38.11	.37	37.86
BDU	FM 21-40	500 Watts	0%	8 days	38.17	.54	37.79
BDU	FM 21-40	500 Watts	0%	4 days	38.39	1.65	37.37
BDU	FM 21-40	500 Watts	0%	0 days	39.15	24.91	28.53
BDU	FM 21-40	500 Watts	2%	12 days	38.55	3.32	36.74
BDU	FM 21-40	500 Watts	2%	8 days	38.67	5.55	35.89
BDU	FM 21-40	500 Watts	2%	4 days	38.94	13.87	32.73
BDU	FM 21-40	500 Watts	2%	0 days	39.49	49.61	19.15
BDU	FM 21-40	500 Watts	4%	12 days	39.28	33.78	25.16
BDU	FM 21-40	500 Watts	4%	8 days	39.42	44.19	21.21
BDU	FM 21-40	500 Watts	4%	4 days	39.61	58.11	15.92
BDU	FM 21-40	500 Watts	4%	0 days	39.84	74.46	9.71
BDU	FM 21-40	500 Watts	6%	12 days	40.19	90.75	3.52
BDU	FM 21-40	500 Watts	6%	8 days	40.19	90.75	3.52
BDU	FM 21-40	500 Watts	6%	4 days	40.19	90.75	3.52
BDU	FM 21-40	500 Watts	6%	0 days	40.19	90.75	3.52
BDU	FM 21-40	600 Watts	0%	12 days	38.38	1.56	37.41
BDU	FM 21-40	600 Watts	0%	8 days	38.45	2.13	37.19
BDU	FM 21-40	600 Watts	0%	4 days	38.67	5.52	35.90
BDU	FM 21-40	600 Watts	0%	0 days	39.49	49.00	19.38
BDU	FM 21-40	600 Watts	2%	12 days	38.82	9.50	34.39
BDU	FM 21-40	600 Watts	2%	8 days	38.95	14.36	32.54
BDU	FM 21-40	600 Watts	2%	4 days	39.23	30.10	26.56
BDU	FM 21-40	600 Watts	2%	0 days	39.83	73.97	9.89
BDU	FM 21-40	600 Watts	4%	12 days	39.58	55.81	16.79
BDU	FM 21-40	600 Watts	4%	8 days	39.73	67.00	12.54
BDU	FM 21-40	600 Watts	4%	4 days	39.93	79.36	7.84
BDU	FM 21-40	600 Watts	4%	0 days	40.18	90.49	3.61
BDU	FM 21-40	600 Watts	6%	12 days	40.53	97.60	.91
BDU	FM 21-40	600 Watts	6%	8 days	40.53	97.60	.91
BDU	FM 21-40	600 Watts	6%	4 days	40.53	97.60	.91
BDU	FM 21-40	600 Watts	6%	0 days	40.53	97.60	.91

108

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU	FM 21-10 VARIANT	105 Watts	0%	12 days	37.10	0.00	100.00
BDU	FM 21-10 VARIANT	105 Watts	0%	8 days	37.14	0.00	100.00
BDU	FM 21-10 VARIANT	105 Watts	0%	4 days	37.26	0.00	100.00
BDU	FM 21-10 VARIANT	105 Watts	0%	0 days	37.66	.02	99.98
BDU	FM 21-10 VARIANT	105 Watts	2%	12 days	37.50	.01	99.99
BDU	FM 21-10 VARIANT	105 Watts	2%	8 days	37.57	.01	99.99
BDU	FM 21-10 VARIANT	105 Watts	2%	4 days	37.71	.03	99.97
BDU	FM 21-10 VARIANT	105 Watts	2%	0 days	38.01	.21	99.79
BDU	FM 21-10 VARIANT	105 Watts	4%	12 days	38.06	.28	99.72
BDU	FM 21-10 VARIANT	105 Watts	4%	8 days	38.14	.44	99.56
BDU	FM 21-10 VARIANT	105 Watts	4%	4 days	38.23	.74	99.26
BDU	FM 21-10 VARIANT	105 Watts	4%	0 days	38.36	1.39	98.61
BDU	FM 21-10 VARIANT	105 Watts	6%	12 days	38.70	6.28	93.72
BDU	FM 21-10 VARIANT	105 Watts	6%	8 days	38.70	6.28	93.72
BDU	FM 21-10 VARIANT	105 Watts	6%	4 days	38.70	6.28	93.72
BDU	FM 21-10 VARIANT	105 Watts	6%	0 days	38.70	6.28	93.72
BDU	FM 21-10 VARIANT	150 Watts	0%	12 days	37.28	0.00	93.00
BDU	FM 21-10 VARIANT	150 Watts	0%	8 days	37.32	0.00	93.00
BDU	FM 21-10 VARIANT	150 Watts	0%	4 days	37.46	0.00	93.00
BDU	FM 21-10 VARIANT	150 Watts	0%	0 days	37.92	.12	92.89
BDU	FM 21-10 VARIANT	150 Watts	2%	12 days	37.69	.02	92.98
BDU	FM 21-10 VARIANT	150 Watts	2%	8 days	37.77	.04	92.96
BDU	FM 21-10 VARIANT	150 Watts	2%	4 days	37.93	.13	92.88
BDU	FM 21-10 VARIANT	150 Watts	2%	0 days	38.27	.91	92.15
BDU	FM 21-10 VARIANT	150 Watts	4%	12 days	38.28	.94	92.13
BDU	FM 21-10 VARIANT	150 Watts	4%	8 days	38.37	1.46	91.64
BDU	FM 21-10 VARIANT	150 Watts	4%	4 days	38.48	2.46	90.71
BDU	FM 21-10 VARIANT	150 Watts	4%	0 days	38.62	4.50	88.82
BDU	FM 21-10 VARIANT	150 Watts	6%	12 days	38.97	15.19	78.87
BDU	FM 21-10 VARIANT	150 Watts	6%	8 days	38.97	15.19	78.87
BDU	FM 21-10 VARIANT	150 Watts	6%	4 days	38.97	15.19	78.87
BDU	FM 21-10 VARIANT	150 Watts	6%	0 days	38.97	15.19	78.87
BDU	FM 21-10 VARIANT	300 Watts	0%	12 days	37.94	.14	92.87
BDU	FM 21-10 VARIANT	300 Watts	0%	8 days	38.00	.20	92.81
BDU	FM 21-10 VARIANT	300 Watts	0%	4 days	38.20	.62	92.42
BDU	FM 21-10 VARIANT	300 Watts	0%	0 days	38.86	10.90	82.86
BDU	FM 21-10 VARIANT	300 Watts	2%	12 days	38.37	1.50	91.61
BDU	FM 21-10 VARIANT	300 Watts	2%	8 days	38.49	2.57	90.61
BDU	FM 21-10 VARIANT	300 Watts	2%	4 days	38.72	6.74	86.73
BDU	FM 21-10 VARIANT	300 Watts	2%	0 days	39.21	28.62	66.38
BDU	FM 21-10 VARIANT	300 Watts	4%	12 days	39.07	20.39	74.04
BDU	FM 21-10 VARIANT	300 Watts	4%	8 days	39.19	27.82	67.13
BDU	FM 21-10 VARIANT	300 Watts	4%	4 days	39.35	38.83	56.89
BDU	FM 21-10 VARIANT	300 Watts	4%	0 days	39.55	54.11	42.68
BDU	FM 21-10 VARIANT	300 Watts	6%	12 days	39.90	77.96	20.50
BDU	FM 21-10 VARIANT	300 Watts	6%	8 days	39.90	77.96	20.50
BDU	FM 21-10 VARIANT	300 Watts	6%	4 days	39.90	77.96	20.50
BDU	FM 21-10 VARIANT	300 Watts	6%	0 days	39.90	77.96	20.50
BDU	FM 21-10 VARIANT	400 Watts	0%	12 days	38.44	2.08	91.07
BDU	FM 21-10 VARIANT	400 Watts	0%	8 days	38.51	2.83	90.37
BDU	FM 21-10 VARIANT	400 Watts	0%	4 days	38.73	7.02	86.47
BDU	FM 21-10 VARIANT	400 Watts	0%	0 days	39.48	48.32	48.06
BDU	FM 21-10 VARIANT	400 Watts	2%	12 days	38.88	11.73	82.09
BDU	FM 21-10 VARIANT	400 Watts	2%	8 days	39.01	17.39	76.83
BDU	FM 21-10 VARIANT	400 Watts	2%	4 days	39.28	33.50	61.85
BDU	FM 21-10 VARIANT	400 Watts	2%	0 days	39.83	73.42	24.72
BDU	FM 21-10 VARIANT	400 Watts	4%	12 days	39.63	59.54	37.63
BDU	FM 21-10 VARIANT	400 Watts	4%	8 days	39.77	69.57	28.30
BDU	FM 21-10 VARIANT	400 Watts	4%	4 days	39.94	80.40	18.23
BDU	FM 21-10 VARIANT	400 Watts	4%	0 days	40.17	90.20	9.11
BDU	FM 21-10 VARIANT	400 Watts	6%	12 days	40.52	97.50	2.33
BDU	FM 21-10 VARIANT	400 Watts	6%	8 days	40.52	97.50	2.33
BDU	FM 21-10 VARIANT	400 Watts	6%	4 days	40.52	97.50	2.33
BDU	FM 21-10 VARIANT	400 Watts	6%	0 days	40.52	97.50	2.33

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU	FM 21-10 VARIANT	500 Watts	0%	12 days	38.98	15.96	78.16
BDU	FM 21-10 VARIANT	500 Watts	0%	8 days	39.06	19.78	74.60
BDU	FM 21-10 VARIANT	500 Watts	0%	4 days	39.31	35.84	59.67
BDU	FM 21-10 VARIANT	500 Watts	0%	0 days	40.15	89.48	9.78
BDU	FM 21-10 VARIANT	500 Watts	2%	12 days	39.44	45.03	51.12
BDU	FM 21-10 VARIANT	500 Watts	2%	8 days	39.58	56.21	40.72
BDU	FM 21-10 VARIANT	500 Watts	2%	4 days	39.88	76.86	21.52
BDU	FM 21-10 VARIANT	500 Watts	2%	0 days	40.50	97.26	2.55
BDU	FM 21-10 VARIANT	500 Watts	4%	12 days	40.23	91.95	7.49
BDU	FM 21-10 VARIANT	500 Watts	4%	8 days	40.39	95.61	4.08
BDU	FM 21-10 VARIANT	500 Watts	4%	4 days	40.59	98.19	1.68
BDU	FM 21-10 VARIANT	500 Watts	4%	0 days	40.84	99.52	.45
BDU	FM 21-10 VARIANT	500 Watts	6%	12 days	41.19	99.94	.06
BDU	FM 21-10 VARIANT	500 Watts	6%	8 days	41.19	99.94	.06
BDU	FM 21-10 VARIANT	500 Watts	6%	4 days	41.19	99.94	.06
BDU	FM 21-10 VARIANT	500 Watts	6%	0 days	41.19	99.94	.06
BDU	FM 21-10 VARIANT	600 Watts	0%	12 days	39.59	56.92	40.06
BDU	FM 21-10 VARIANT	600 Watts	0%	8 days	39.67	63.13	34.29
BDU	FM 21-10 VARIANT	600 Watts	0%	4 days	39.95	80.77	17.88
BDU	FM 21-10 VARIANT	600 Watts	0%	0 days	40.87	99.59	.38
BDU	FM 21-10 VARIANT	600 Watts	2%	12 days	40.05	85.66	13.34
BDU	FM 21-10 VARIANT	600 Watts	2%	8 days	40.21	91.53	7.88
BDU	FM 21-10 VARIANT	600 Watts	2%	4 days	40.54	97.77	2.07
BDU	FM 21-10 VARIANT	600 Watts	2%	0 days	41.22	99.95	.05
BDU	FM 21-10 VARIANT	600 Watts	4%	12 days	40.89	99.63	.34
BDU	FM 21-10 VARIANT	600 Watts	4%	8 days	41.07	99.87	.12
BDU	FM 21-10 VARIANT	600 Watts	4%	4 days	41.29	99.97	.03
BDU	FM 21-10 VARIANT	600 Watts	4%	0 days	41.57	100.00	0.00
BDU	FM 21-10 VARIANT	600 Watts	6%	12 days	41.91	100.00	0.00
BDU	FM 21-10 VARIANT	600 Watts	6%	8 days	41.91	100.00	0.00
BDU	FM 21-10 VARIANT	600 Watts	6%	4 days	41.91	100.00	0.00
BDU	FM 21-10 VARIANT	600 Watts	6%	0 days	41.91	100.00	0.00
BDU	FM 21-40 VARIANT	105 Watts	0%	12 days	37.10	0.00	100.00
BDU	FM 21-40 VARIANT	105 Watts	0%	8 days	37.14	0.00	100.00
BDU	FM 21-40 VARIANT	105 Watts	0%	4 days	37.26	0.00	100.00
BDU	FM 21-40 VARIANT	105 Watts	0%	0 days	37.66	.02	99.98
BDU	FM 21-40 VARIANT	105 Watts	2%	12 days	37.50	.01	99.99
BDU	FM 21-40 VARIANT	105 Watts	2%	8 days	37.57	.01	99.99
BDU	FM 21-40 VARIANT	105 Watts	2%	4 days	37.71	.03	99.97
BDU	FM 21-40 VARIANT	105 Watts	2%	0 days	38.01	.21	99.79
BDU	FM 21-40 VARIANT	105 Watts	4%	12 days	38.06	.28	99.72
BDU	FM 21-40 VARIANT	105 Watts	4%	8 days	38.14	.44	99.56
BDU	FM 21-40 VARIANT	105 Watts	4%	4 days	38.23	.74	99.26
BDU	FM 21-40 VARIANT	105 Watts	4%	0 days	38.36	1.39	98.61
BDU	FM 21-40 VARIANT	105 Watts	6%	12 days	38.70	6.28	93.72
BDU	FM 21-40 VARIANT	105 Watts	6%	8 days	38.70	6.28	93.72
BDU	FM 21-40 VARIANT	105 Watts	6%	4 days	38.70	6.28	93.72
BDU	FM 21-40 VARIANT	105 Watts	6%	0 days	38.70	6.28	93.72
BDU	FM 21-40 VARIANT	150 Watts	0%	12 days	37.30	0.00	100.00
BDU	FM 21-40 VARIANT	150 Watts	0%	8 days	37.34	0.00	100.00
BDU	FM 21-40 VARIANT	150 Watts	0%	4 days	37.48	.01	99.99
BDU	FM 21-40 VARIANT	150 Watts	0%	0 days	37.95	.15	99.85
BDU	FM 21-40 VARIANT	150 Watts	2%	12 days	37.70	.03	99.97
BDU	FM 21-40 VARIANT	150 Watts	2%	8 days	37.79	.05	99.95
BDU	FM 21-40 VARIANT	150 Watts	2%	4 days	37.95	.15	99.85
BDU	FM 21-40 VARIANT	150 Watts	2%	0 days	38.30	1.05	98.95
BDU	FM 21-40 VARIANT	150 Watts	4%	12 days	38.30	1.05	98.95
BDU	FM 21-40 VARIANT	150 Watts	4%	8 days	38.39	1.64	98.36
BDU	FM 21-40 VARIANT	150 Watts	4%	4 days	38.50	2.76	97.24
BDU	FM 21-40 VARIANT	150 Watts	4%	0 days	38.65	5.05	94.95
BDU	FM 21-40 VARIANT	150 Watts	6%	12 days	38.99	16.53	83.47
BDU	FM 21-40 VARIANT	150 Watts	6%	8 days	38.99	16.53	83.47
BDU	FM 21-40 VARIANT	150 Watts	6%	4 days	38.99	16.53	83.47
BDU	FM 21-40 VARIANT	150 Watts	6%	0 days	38.99	16.53	83.47

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU	FM 21-40 VARIANT	300 Watts	0%	12 days	37.77	.04	52.98
BDU	FM 21-40 VARIANT	300 Watts	0%	8 days	37.82	.06	52.97
BDU	FM 21-40 VARIANT	300 Watts	0%	4 days	38.00	.19	52.90
BDU	FM 21-40 VARIANT	300 Watts	0%	0 days	38.59	4.06	50.85
BDU	FM 21-40 VARIANT	300 Watts	2%	12 days	38.19	.58	52.69
BDU	FM 21-40 VARIANT	300 Watts	2%	8 days	38.29	1.00	52.47
BDU	FM 21-40 VARIANT	300 Watts	2%	4 days	38.50	2.76	51.54
BDU	FM 21-40 VARIANT	300 Watts	2%	0 days	38.94	14.07	45.54
BDU	FM 21-40 VARIANT	300 Watts	4%	12 days	38.85	10.56	47.40
BDU	FM 21-40 VARIANT	300 Watts	4%	8 days	38.96	15.04	45.03
BDU	FM 21-40 VARIANT	300 Watts	4%	4 days	39.10	22.36	41.15
BDU	FM 21-40 VARIANT	300 Watts	4%	0 days	39.29	34.09	34.93
BDU	FM 21-40 VARIANT	300 Watts	6%	12 days	39.63	60.13	21.13
BDU	FM 21-40 VARIANT	300 Watts	6%	8 days	39.63	60.13	21.13
BDU	FM 21-40 VARIANT	300 Watts	6%	4 days	39.63	60.13	21.13
BDU	FM 21-40 VARIANT	300 Watts	6%	0 days	39.63	60.13	21.13
BDU	FM 21-40 VARIANT	400 Watts	0%	12 days	38.20	.63	52.67
BDU	FM 21-40 VARIANT	400 Watts	0%	8 days	38.27	.88	52.53
BDU	FM 21-40 VARIANT	400 Watts	0%	4 days	38.48	2.44	51.71
BDU	FM 21-40 VARIANT	400 Watts	0%	0 days	39.17	26.44	38.99
BDU	FM 21-40 VARIANT	400 Watts	2%	12 days	38.64	4.86	50.42
BDU	FM 21-40 VARIANT	400 Watts	2%	8 days	38.76	7.68	48.93
BDU	FM 21-40 VARIANT	400 Watts	2%	4 days	39.01	17.13	43.92
BDU	FM 21-40 VARIANT	400 Watts	2%	0 days	39.52	51.46	25.73
BDU	FM 21-40 VARIANT	400 Watts	4%	12 days	39.35	38.87	32.40
BDU	FM 21-40 VARIANT	400 Watts	4%	8 days	39.48	48.81	27.13
BDU	FM 21-40 VARIANT	400 Watts	4%	4 days	39.65	61.50	20.41
BDU	FM 21-40 VARIANT	400 Watts	4%	0 days	39.87	75.89	12.78
BDU	FM 21-40 VARIANT	400 Watts	6%	12 days	40.21	91.45	4.53
BDU	FM 21-40 VARIANT	400 Watts	6%	8 days	40.21	91.45	4.53
BDU	FM 21-40 VARIANT	400 Watts	6%	4 days	40.21	91.45	4.53
BDU	FM 21-40 VARIANT	400 Watts	6%	0 days	40.21	91.45	4.53
BDU	FM 21-40 VARIANT	500 Watts	0%	12 days	38.39	1.83	43.19
BDU	FM 21-40 VARIANT	500 Watts	0%	8 days	38.45	2.52	42.89
BDU	FM 21-40 VARIANT	500 Watts	0%	4 days	38.66	6.58	41.10
BDU	FM 21-40 VARIANT	500 Watts	0%	0 days	39.37	51.15	21.49
BDU	FM 21-40 VARIANT	500 Watts	2%	12 days	38.82	10.80	39.25
BDU	FM 21-40 VARIANT	500 Watts	2%	8 days	38.94	16.40	36.78
BDU	FM 21-40 VARIANT	500 Watts	2%	4 days	39.19	33.02	29.47
BDU	FM 21-40 VARIANT	500 Watts	2%	0 days	39.71	75.69	10.70
BDU	FM 21-40 VARIANT	500 Watts	4%	12 days	39.54	59.82	17.68
BDU	FM 21-40 VARIANT	500 Watts	4%	8 days	39.67	69.72	13.32
BDU	FM 21-40 VARIANT	500 Watts	4%	4 days	39.84	81.24	8.25
BDU	FM 21-40 VARIANT	500 Watts	4%	0 days	40.06	91.36	3.80
BDU	FM 21-40 VARIANT	500 Watts	6%	12 days	40.41	97.89	.93
BDU	FM 21-40 VARIANT	500 Watts	6%	8 days	40.41	97.89	.93
BDU	FM 21-40 VARIANT	500 Watts	6%	4 days	40.41	97.89	.93
BDU	FM 21-40 VARIANT	500 Watts	6%	0 days	40.41	97.89	.93
BDU	FM 21-40 VARIANT	600 Watts	0%	12 days	38.82	9.54	39.80
BDU	FM 21-40 VARIANT	600 Watts	0%	8 days	38.90	12.30	38.59
BDU	FM 21-40 VARIANT	600 Watts	0%	4 days	39.15	25.33	32.85
BDU	FM 21-40 VARIANT	600 Watts	0%	0 days	40.04	85.13	6.54
BDU	FM 21-40 VARIANT	600 Watts	2%	12 days	39.27	33.16	29.41
BDU	FM 21-40 VARIANT	600 Watts	2%	8 days	39.42	44.07	24.61
BDU	FM 21-40 VARIANT	600 Watts	2%	4 days	39.73	67.26	14.41
BDU	FM 21-40 VARIANT	600 Watts	2%	0 days	40.39	95.63	1.92
BDU	FM 21-40 VARIANT	600 Watts	4%	12 days	40.08	86.74	5.83
BDU	FM 21-40 VARIANT	600 Watts	4%	8 days	40.25	92.42	3.34
BDU	FM 21-40 VARIANT	600 Watts	4%	4 days	40.46	96.75	1.43
BDU	FM 21-40 VARIANT	600 Watts	4%	0 days	40.74	99.13	.38
BDU	FM 21-40 VARIANT	600 Watts	6%	12 days	41.08	99.88	.05
BDU	FM 21-40 VARIANT	600 Watts	6%	8 days	41.08	99.88	.05
BDU	FM 21-40 VARIANT	600 Watts	6%	4 days	41.08	99.88	.05
BDU	FM 21-40 VARIANT	600 Watts	6%	0 days	41.08	99.88	.05

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDO IV	NONE	105 Watts	0%	12 days	37.26	0.00	100.00
BDO IV	NONE	105 Watts	0%	8 days	37.29	0.00	100.00
BDO IV	NONE	105 Watts	0%	4 days	37.40	0.00	100.00
BDO IV	NONE	105 Watts	0%	0 days	37.79	.05	99.95
BDO IV	NONE	105 Watts	2%	12 days	37.65	.02	99.98
BDO IV	NONE	105 Watts	2%	8 days	37.72	.03	99.97
BDO IV	NONE	105 Watts	2%	4 days	37.84	.07	99.93
BDO IV	NONE	105 Watts	2%	0 days	38.14	.43	99.57
BDO IV	NONE	105 Watts	4%	12 days	38.19	.59	99.41
BDO IV	NONE	105 Watts	4%	8 days	38.26	.85	99.15
BDO IV	NONE	105 Watts	4%	4 days	38.36	1.40	98.60
BDO IV	NONE	105 Watts	4%	0 days	38.48	2.52	97.48
BDO IV	NONE	105 Watts	6%	12 days	38.83	9.86	90.14
BDO IV	NONE	105 Watts	6%	8 days	38.83	9.86	90.14
BDO IV	NONE	105 Watts	6%	4 days	38.83	9.86	90.14
BDO IV	NONE	105 Watts	6%	0 days	38.83	9.86	90.14
BDO IV	NONE	150 Watts	0%	12 days	37.50	.01	99.99
BDO IV	NONE	150 Watts	0%	8 days	37.54	.01	99.99
BDO IV	NONE	150 Watts	0%	4 days	37.67	.02	99.98
BDO IV	NONE	150 Watts	0%	0 days	38.11	.37	99.63
BDO IV	NONE	150 Watts	2%	12 days	37.90	.11	99.89
BDO IV	NONE	150 Watts	2%	8 days	37.98	.17	99.83
BDO IV	NONE	150 Watts	2%	4 days	38.13	.42	99.58
BDO IV	NONE	150 Watts	2%	0 days	38.45	2.22	97.78
BDO IV	NONE	150 Watts	4%	12 days	38.48	2.43	97.57
BDO IV	NONE	150 Watts	4%	8 days	38.56	3.46	96.54
BDO IV	NONE	150 Watts	4%	4 days	38.66	5.25	94.75
BDO IV	NONE	150 Watts	4%	0 days	38.80	8.96	91.04
BDO IV	NONE	150 Watts	6%	12 days	39.15	24.97	75.03
BDO IV	NONE	150 Watts	6%	8 days	39.15	24.97	75.03
BDO IV	NONE	150 Watts	6%	4 days	39.15	24.97	75.03
BDO IV	NONE	150 Watts	6%	0 days	39.15	24.97	75.03
BDO IV	NONE	300 Watts	0%	12 days	38.41	1.77	98.23
BDO IV	NONE	300 Watts	0%	8 days	38.46	2.30	97.70
BDO IV	NONE	300 Watts	0%	4 days	38.65	5.11	94.89
BDO IV	NONE	300 Watts	0%	0 days	39.27	33.08	66.92
BDO IV	NONE	300 Watts	2%	12 days	38.83	9.93	90.07
BDO IV	NONE	300 Watts	2%	8 days	38.94	14.07	85.93
BDO IV	NONE	300 Watts	2%	4 days	39.16	25.81	74.19
BDO IV	NONE	300 Watts	2%	0 days	39.62	59.09	40.91
BDO IV	NONE	300 Watts	4%	12 days	39.51	50.74	49.26
BDO IV	NONE	300 Watts	4%	8 days	39.63	59.66	40.34
BDO IV	NONE	300 Watts	4%	4 days	39.78	70.27	29.73
BDO IV	NONE	300 Watts	4%	0 days	39.97	81.53	18.47
BDO IV	NONE	300 Watts	6%	12 days	40.31	94.12	5.88
BDO IV	NONE	300 Watts	6%	8 days	40.31	94.12	5.88
BDO IV	NONE	300 Watts	6%	4 days	40.31	94.12	5.88
BDO IV	NONE	300 Watts	6%	0 days	40.31	94.12	5.88
BDO IV	NONE	400 Watts	0%	12 days	39.14	24.25	75.75
BDO IV	NONE	400 Watts	0%	8 days	39.20	28.43	71.57
BDO IV	NONE	400 Watts	0%	4 days	39.42	44.24	55.76
BDO IV	NONE	400 Watts	0%	0 days	40.16	89.75	10.25
BDO IV	NONE	400 Watts	2%	12 days	39.58	55.85	44.15
BDO IV	NONE	400 Watts	2%	8 days	39.70	65.28	34.72
BDO IV	NONE	400 Watts	2%	4 days	39.97	81.53	18.47
BDO IV	NONE	400 Watts	2%	0 days	40.51	97.35	2.65
BDO IV	NONE	400 Watts	4%	12 days	40.31	94.12	5.88
BDO IV	NONE	400 Watts	4%	8 days	40.45	96.65	3.35
BDO IV	NONE	400 Watts	4%	4 days	40.63	98.50	1.50
BDO IV	NONE	400 Watts	4%	0 days	40.85	99.54	.46
BDO IV	NONE	400 Watts	6%	12 days	41.20	99.95	.05
BDO IV	NONE	400 Watts	6%	8 days	41.20	99.95	.05
BDO IV	NONE	400 Watts	6%	4 days	41.20	99.95	.05
BDO IV	NONE	400 Watts	6%	0 days	41.20	99.95	.05

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDO IV	NONE	500 Watts	0%	12 days	40.03	84.66	15.34
BDO IV	NONE	500 Watts	0%	8 days	40.11	87.83	12.17
BDO IV	NONE	500 Watts	0%	4 days	40.36	95.03	4.97
BDO IV	NONE	500 Watts	0%	0 days	41.19	99.94	.06
BDO IV	NONE	500 Watts	2%	12 days	40.48	97.06	2.94
BDO IV	NONE	500 Watts	2%	8 days	40.63	98.49	1.51
BDO IV	NONE	500 Watts	2%	4 days	40.92	99.69	.31
BDO IV	NONE	500 Watts	2%	0 days	41.53	100.00	0.00
BDO IV	NONE	500 Watts	4%	12 days	41.27	99.97	.03
BDO IV	NONE	500 Watts	4%	8 days	41.43	99.99	.01
BDO IV	NONE	500 Watts	4%	4 days	41.63	100.00	0.00
BDO IV	NONE	500 Watts	4%	0 days	41.88	100.00	0.00
BDO IV	NONE	500 Watts	6%	12 days	42.23	100.00	0.00
BDO IV	NONE	500 Watts	6%	8 days	42.23	100.00	0.00
BDO IV	NONE	500 Watts	6%	4 days	42.23	100.00	0.00
BDO IV	NONE	500 Watts	6%	0 days	42.23	100.00	0.00
BDO IV	NONE	600 Watts	0%	12 days	41.17	99.94	.06
BDO IV	NONE	600 Watts	0%	8 days	41.26	99.96	.04
BDO IV	NONE	600 Watts	0%	4 days	41.53	100.00	0.00
BDO IV	NONE	600 Watts	0%	0 days	42.44	100.00	0.00
BDO IV	NONE	600 Watts	2%	12 days	41.63	100.00	0.00
BDO IV	NONE	600 Watts	2%	8 days	41.79	100.00	0.00
BDO IV	NONE	600 Watts	2%	4 days	42.12	100.00	0.00
BDO IV	NONE	600 Watts	2%	0 days	42.78	100.00	0.00
BDO IV	NONE	600 Watts	4%	12 days	42.46	100.00	0.00
BDO IV	NONE	600 Watts	4%	8 days	42.64	100.00	0.00
BDO IV	NONE	600 Watts	4%	4 days	42.85	100.00	0.00
BDO IV	NONE	600 Watts	4%	0 days	43.13	100.00	0.00
BDO IV	NONE	600 Watts	6%	12 days	43.48	100.00	0.00
BDO IV	NONE	600 Watts	6%	8 days	43.48	100.00	0.00
BDO IV	NONE	600 Watts	6%	4 days	43.48	100.00	0.00
BDO IV	NONE	600 Watts	6%	0 days	43.48	100.00	0.00
BDO IV	FM 21-10	105 Watts	0%	12 days	37.26	0.00	100.00
BDO IV	FM 21-10	105 Watts	0%	8 days	37.29	0.00	100.00
BDO IV	FM 21-10	105 Watts	0%	4 days	37.40	0.00	100.00
BDO IV	FM 21-10	105 Watts	0%	0 days	37.79	.05	99.95
BDO IV	FM 21-10	105 Watts	2%	12 days	37.65	.02	99.98
BDO IV	FM 21-10	105 Watts	2%	8 days	37.72	.03	99.97
BDO IV	FM 21-10	105 Watts	2%	4 days	37.84	.07	99.93
BDO IV	FM 21-10	105 Watts	2%	0 days	38.14	.43	99.57
BDO IV	FM 21-10	105 Watts	4%	12 days	38.19	.59	99.41
BDO IV	FM 21-10	105 Watts	4%	8 days	38.26	.85	99.15
BDO IV	FM 21-10	105 Watts	4%	4 days	38.36	1.40	98.60
BDO IV	FM 21-10	105 Watts	4%	0 days	38.48	2.52	97.48
BDO IV	FM 21-10	105 Watts	6%	12 days	38.83	9.86	90.14
BDO IV	FM 21-10	105 Watts	6%	8 days	38.83	9.86	90.14
BDO IV	FM 21-10	105 Watts	6%	4 days	38.83	9.86	90.14
BDO IV	FM 21-10	105 Watts	6%	0 days	38.83	9.86	90.14
BDO IV	FM 21-10	150 Watts	0%	12 days	37.35	0.00	33.00
BDO IV	FM 21-10	150 Watts	0%	8 days	37.39	0.00	33.00
BDO IV	FM 21-10	150 Watts	0%	4 days	37.50	.01	33.00
BDO IV	FM 21-10	150 Watts	0%	0 days	37.91	.11	32.96
BDO IV	FM 21-10	150 Watts	2%	12 days	37.75	.04	32.99
BDO IV	FM 21-10	150 Watts	2%	8 days	37.82	.06	32.98
BDO IV	FM 21-10	150 Watts	2%	4 days	37.95	.15	32.95
BDO IV	FM 21-10	150 Watts	2%	0 days	38.26	.85	32.72
BDO IV	FM 21-10	150 Watts	4%	12 days	38.30	1.06	32.65
BDO IV	FM 21-10	150 Watts	4%	8 days	38.37	1.51	32.50
BDO IV	FM 21-10	150 Watts	4%	4 days	38.47	2.42	32.20
BDO IV	FM 21-10	150 Watts	4%	0 days	38.61	4.28	31.59
BDO IV	FM 21-10	150 Watts	6%	12 days	38.95	14.66	28.16
BDO IV	FM 21-10	150 Watts	6%	8 days	38.95	14.66	28.16
BDO IV	FM 21-10	150 Watts	6%	4 days	38.95	14.66	28.16
BDO IV	FM 21-10	150 Watts	6%	0 days	38.95	14.66	28.16

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDO IV	FM 21-10	300 Watts	0%	12 days	37.76	.04	32.99
BDO IV	FM 21-10	300 Watts	0%	8 days	37.80	.05	32.98
BDO IV	FM 21-10	300 Watts	0%	4 days	37.95	.15	32.95
BDO IV	FM 21-10	300 Watts	0%	0 days	38.47	2.40	32.21
BDO IV	FM 21-10	300 Watts	2%	12 days	38.17	.51	32.83
BDO IV	FM 21-10	300 Watts	2%	8 days	38.25	.83	32.73
BDO IV	FM 21-10	300 Watts	2%	4 days	38.44	2.04	32.33
BDO IV	FM 21-10	300 Watts	2%	0 days	38.82	9.50	29.87
BDO IV	FM 21-10	300 Watts	4%	12 days	38.78	8.40	30.23
BDO IV	FM 21-10	300 Watts	4%	8 days	38.88	11.68	29.15
BDO IV	FM 21-10	300 Watts	4%	4 days	39.01	17.08	27.36
BDO IV	FM 21-10	300 Watts	4%	0 days	39.17	26.01	24.42
BDO IV	FM 21-10	300 Watts	6%	12 days	39.51	50.98	16.18
BDO IV	FM 21-10	300 Watts	6%	8 days	39.51	50.98	16.18
BDO IV	FM 21-10	300 Watts	6%	4 days	39.51	50.98	16.18
BDO IV	FM 21-10	300 Watts	6%	0 days	39.51	50.98	16.18
BDO IV	FM 21-10	400 Watts	0%	12 days	38.06	.28	32.91
BDO IV	FM 21-10	400 Watts	0%	8 days	38.11	.38	32.87
BDO IV	FM 21-10	400 Watts	0%	4 days	38.28	.96	32.68
BDO IV	FM 21-10	400 Watts	0%	0 days	38.87	11.43	29.23
BDO IV	FM 21-10	400 Watts	2%	12 days	38.48	2.46	32.19
BDO IV	FM 21-10	400 Watts	2%	8 days	38.58	3.80	31.75
BDO IV	FM 21-10	400 Watts	2%	4 days	38.78	8.43	30.22
BDO IV	FM 21-10	400 Watts	2%	0 days	39.22	29.58	23.24
BDO IV	FM 21-10	400 Watts	4%	12 days	39.13	23.92	25.11
BDO IV	FM 21-10	400 Watts	4%	8 days	39.24	31.01	22.77
BDO IV	FM 21-10	400 Watts	4%	4 days	39.38	41.23	19.39
BDO IV	FM 21-10	400 Watts	4%	0 days	39.57	55.22	14.78
BDO IV	FM 21-10	400 Watts	6%	12 days	39.92	78.78	7.00
BDO IV	FM 21-10	400 Watts	6%	8 days	39.92	78.78	7.00
BDO IV	FM 21-10	400 Watts	6%	4 days	39.92	78.78	7.00
BDO IV	FM 21-10	400 Watts	6%	0 days	39.92	78.78	7.00
BDO IV	FM 21-10	500 Watts	0%	12 days	38.36	1.40	32.54
BDO IV	FM 21-10	500 Watts	0%	8 days	38.41	1.83	32.40
BDO IV	FM 21-10	500 Watts	0%	4 days	38.60	4.17	31.62
BDO IV	FM 21-10	500 Watts	0%	0 days	39.24	30.80	22.84
BDO IV	FM 21-10	500 Watts	2%	12 days	38.78	8.37	30.24
BDO IV	FM 21-10	500 Watts	2%	8 days	38.89	12.02	29.03
BDO IV	FM 21-10	500 Watts	2%	4 days	39.11	22.85	25.46
BDO IV	FM 21-10	500 Watts	2%	0 days	39.59	56.59	14.33
BDO IV	FM 21-10	500 Watts	4%	12 days	39.46	46.96	17.50
BDO IV	FM 21-10	500 Watts	4%	8 days	39.58	56.13	14.48
BDO IV	FM 21-10	500 Watts	4%	4 days	39.73	67.39	10.76
BDO IV	FM 21-10	500 Watts	4%	0 days	39.93	79.77	6.68
BDO IV	FM 21-10	500 Watts	6%	12 days	40.28	93.33	2.20
BDO IV	FM 21-10	500 Watts	6%	8 days	40.28	93.33	2.20
BDO IV	FM 21-10	500 Watts	6%	4 days	40.28	93.33	2.20
BDO IV	FM 21-10	500 Watts	6%	0 days	40.28	93.33	2.20
BDO IV	FM 21-10	600 Watts	0%	12 days	38.68	5.63	31.14
BDO IV	FM 21-10	600 Watts	0%	8 days	38.73	7.00	30.69
BDO IV	FM 21-10	600 Watts	0%	4 days	38.93	13.49	28.55
BDO IV	FM 21-10	600 Watts	0%	0 days	39.59	57.03	14.18
BDO IV	FM 21-10	600 Watts	2%	12 days	39.10	22.21	25.67
BDO IV	FM 21-10	600 Watts	2%	8 days	39.21	29.10	23.40
BDO IV	FM 21-10	600 Watts	2%	4 days	39.45	45.90	17.85
BDO IV	FM 21-10	600 Watts	2%	0 days	39.94	80.09	6.57
BDO IV	FM 21-10	600 Watts	4%	12 days	39.79	71.39	9.44
BDO IV	FM 21-10	600 Watts	4%	8 days	39.92	78.95	6.95
BDO IV	FM 21-10	600 Watts	4%	4 days	40.08	86.73	4.38
BDO IV	FM 21-10	600 Watts	4%	0 days	40.29	93.48	2.15
BDO IV	FM 21-10	600 Watts	6%	12 days	40.63	98.54	.48
BDO IV	FM 21-10	600 Watts	6%	8 days	40.63	98.54	.48
BDO IV	FM 21-10	600 Watts	6%	4 days	40.63	98.54	.48
BDO IV	FM 21-10	600 Watts	6%	0 days	40.63	98.54	.48

114

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDO IV	MET LIMIT 39oC	105 Watts	0%	12 days	37.26	0.00	100.00
BDO IV	MET LIMIT 39oC	105 Watts	0%	8 days	37.29	0.00	100.00
BDO IV	MET LIMIT 39oC	105 Watts	0%	4 days	37.40	0.00	100.00
BDO IV	MET LIMIT 39oC	105 Watts	0%	0 days	37.79	.05	99.95
BDO IV	MET LIMIT 39oC	105 Watts	2%	12 days	37.65	.02	99.98
BDO IV	MET LIMIT 39oC	105 Watts	2%	8 days	37.72	.03	99.97
BDO IV	MET LIMIT 39oC	105 Watts	2%	4 days	37.84	.07	99.93
BDO IV	MET LIMIT 39oC	105 Watts	2%	0 days	38.14	.43	99.57
BDO IV	MET LIMIT 39oC	105 Watts	4%	12 days	38.19	.59	99.41
BDO IV	MET LIMIT 39oC	105 Watts	4%	8 days	38.26	.85	99.15
BDO IV	MET LIMIT 39oC	105 Watts	4%	4 days	38.36	1.40	98.60
BDO IV	MET LIMIT 39oC	105 Watts	4%	0 days	38.48	2.52	97.48
BDO IV	MET LIMIT 39oC	105 Watts	6%	12 days	38.83	9.86	90.14
BDO IV	MET LIMIT 39oC	105 Watts	6%	8 days	38.83	9.86	90.14
BDO IV	MET LIMIT 39oC	105 Watts	6%	4 days	38.83	9.86	90.14
BDO IV	MET LIMIT 39oC	105 Watts	6%	0 days	38.83	9.86	90.14
BDO IV	MET LIMIT 39oC	150 Watts	0%	12 days	37.50	.01	99.99
BDO IV	MET LIMIT 39oC	150 Watts	0%	8 days	37.54	.01	99.99
BDO IV	MET LIMIT 39oC	150 Watts	0%	4 days	37.67	.02	99.98
BDO IV	MET LIMIT 39oC	150 Watts	0%	0 days	38.11	.37	99.63
BDO IV	MET LIMIT 39oC	150 Watts	2%	12 days	37.90	.11	99.89
BDO IV	MET LIMIT 39oC	150 Watts	2%	8 days	37.98	.17	99.83
BDO IV	MET LIMIT 39oC	150 Watts	2%	4 days	38.13	.42	99.58
BDO IV	MET LIMIT 39oC	150 Watts	2%	0 days	38.45	2.22	97.78
BDO IV	MET LIMIT 39oC	150 Watts	4%	12 days	38.48	2.43	97.57
BDO IV	MET LIMIT 39oC	150 Watts	4%	8 days	38.56	3.46	96.54
BDO IV	MET LIMIT 39oC	150 Watts	4%	4 days	38.66	5.25	94.75
BDO IV	MET LIMIT 39oC	150 Watts	4%	0 days	38.80	8.96	91.04
BDO IV	MET LIMIT 39oC	150 Watts	6%	12 days	39.04	18.84	59.25
BDO IV	MET LIMIT 39oC	150 Watts	6%	8 days	39.04	18.84	59.25
BDO IV	MET LIMIT 39oC	150 Watts	6%	4 days	39.04	18.84	59.25
BDO IV	MET LIMIT 39oC	150 Watts	6%	0 days	39.04	18.84	59.25
BDO IV	MET LIMIT 39oC	300 Watts	0%	12 days	38.41	1.77	98.23
BDO IV	MET LIMIT 39oC	300 Watts	0%	8 days	38.46	2.30	97.70
BDO IV	MET LIMIT 39oC	300 Watts	0%	4 days	38.65	5.11	94.89
BDO IV	MET LIMIT 39oC	300 Watts	0%	0 days	39.04	18.92	71.35
BDO IV	MET LIMIT 39oC	300 Watts	2%	12 days	38.83	9.93	90.07
BDO IV	MET LIMIT 39oC	300 Watts	2%	8 days	38.94	14.07	85.93
BDO IV	MET LIMIT 39oC	300 Watts	2%	4 days	39.04	18.80	77.95
BDO IV	MET LIMIT 39oC	300 Watts	2%	0 days	39.04	19.04	52.62
BDO IV	MET LIMIT 39oC	300 Watts	4%	12 days	39.04	18.88	56.78
BDO IV	MET LIMIT 39oC	300 Watts	4%	8 days	39.04	19.03	50.20
BDO IV	MET LIMIT 39oC	300 Watts	4%	4 days	39.04	19.02	42.11
BDO IV	MET LIMIT 39oC	300 Watts	4%	0 days	39.04	18.97	33.22
BDO IV	MET LIMIT 39oC	300 Watts	6%	12 days	39.04	18.84	13.80
BDO IV	MET LIMIT 39oC	300 Watts	6%	8 days	39.04	18.84	13.80
BDO IV	MET LIMIT 39oC	300 Watts	6%	4 days	39.04	18.84	13.80
BDO IV	MET LIMIT 39oC	300 Watts	6%	0 days	39.04	18.84	13.80
BDO IV	MET LIMIT 39oC	400 Watts	0%	12 days	39.04	18.86	80.33
BDO IV	MET LIMIT 39oC	400 Watts	0%	8 days	39.04	18.64	78.92
BDO IV	MET LIMIT 39oC	400 Watts	0%	4 days	39.04	18.98	72.11
BDO IV	MET LIMIT 39oC	400 Watts	0%	0 days	39.04	18.92	47.03
BDO IV	MET LIMIT 39oC	400 Watts	2%	12 days	39.04	18.92	65.67
BDO IV	MET LIMIT 39oC	400 Watts	2%	8 days	39.04	18.82	60.89
BDO IV	MET LIMIT 39oC	400 Watts	2%	4 days	39.04	18.80	51.16
BDO IV	MET LIMIT 39oC	400 Watts	2%	0 days	39.04	19.04	34.81
BDO IV	MET LIMIT 39oC	400 Watts	4%	12 days	39.04	18.88	37.32
BDO IV	MET LIMIT 39oC	400 Watts	4%	8 days	39.04	19.03	33.20
BDO IV	MET LIMIT 39oC	400 Watts	4%	4 days	39.04	19.02	28.34
BDO IV	MET LIMIT 39oC	400 Watts	4%	0 days	39.04	18.97	21.88
BDO IV	MET LIMIT 39oC	400 Watts	6%	12 days	39.04	18.84	8.93
BDO IV	MET LIMIT 39oC	400 Watts	6%	8 days	39.04	18.84	8.93
BDO IV	MET LIMIT 39oC	400 Watts	6%	4 days	39.04	18.84	8.93
BDO IV	MET LIMIT 39oC	400 Watts	6%	0 days	39.04	18.84	8.93

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDO IV	MET LIMIT 39oC	500 Watts	0%	12 days	39.04	18.86	61.67
BDO IV	MET LIMIT 39oC	500 Watts	0%	8 days	39.04	18.64	60.21
BDO IV	MET LIMIT 39oC	500 Watts	0%	4 days	39.04	18.98	53.47
BDO IV	MET LIMIT 39oC	500 Watts	0%	0 days	39.04	18.92	35.68
BDO IV	MET LIMIT 39oC	500 Watts	2%	12 days	39.04	18.92	48.65
BDO IV	MET LIMIT 39oC	500 Watts	2%	8 days	39.04	18.82	45.46
BDO IV	MET LIMIT 39oC	500 Watts	2%	4 days	39.04	18.80	38.16
BDO IV	MET LIMIT 39oC	500 Watts	2%	0 days	39.04	19.04	25.91
BDO IV	MET LIMIT 39oC	500 Watts	4%	12 days	39.04	18.88	27.58
BDO IV	MET LIMIT 39oC	500 Watts	4%	8 days	39.04	19.03	24.29
BDO IV	MET LIMIT 39oC	500 Watts	4%	4 days	39.04	19.02	21.05
BDO IV	MET LIMIT 39oC	500 Watts	4%	0 days	39.04	18.97	16.21
BDO IV	MET LIMIT 39oC	500 Watts	6%	12 days	39.04	18.84	6.49
BDO IV	MET LIMIT 39oC	500 Watts	6%	8 days	39.04	18.84	6.49
BDO IV	MET LIMIT 39oC	500 Watts	6%	4 days	39.04	18.84	6.49
BDO IV	MET LIMIT 39oC	500 Watts	6%	0 days	39.04	18.84	6.49
BDO IV	MET LIMIT 39oC	600 Watts	0%	12 days	39.04	18.86	49.50
BDO IV	MET LIMIT 39oC	600 Watts	0%	8 days	39.04	18.64	48.00
BDO IV	MET LIMIT 39oC	600 Watts	0%	4 days	39.04	18.98	42.94
BDO IV	MET LIMIT 39oC	600 Watts	0%	0 days	39.04	18.92	28.38
BDO IV	MET LIMIT 39oC	600 Watts	2%	12 days	39.04	18.92	38.92
BDO IV	MET LIMIT 39oC	600 Watts	2%	8 days	39.04	18.82	36.53
BDO IV	MET LIMIT 39oC	600 Watts	2%	4 days	39.04	18.80	30.86
BDO IV	MET LIMIT 39oC	600 Watts	2%	0 days	39.04	19.04	21.05
BDO IV	MET LIMIT 39oC	600 Watts	4%	12 days	39.04	18.88	21.90
BDO IV	MET LIMIT 39oC	600 Watts	4%	8 days	39.04	19.03	19.43
BDO IV	MET LIMIT 39oC	600 Watts	4%	4 days	39.04	19.02	17.01
BDO IV	MET LIMIT 39oC	600 Watts	4%	0 days	39.04	18.97	12.96
BDO IV	MET LIMIT 39oC	600 Watts	6%	12 days	39.04	18.84	5.68
BDO IV	MET LIMIT 39oC	600 Watts	6%	8 days	39.04	18.84	5.68
BDO IV	MET LIMIT 39oC	600 Watts	6%	4 days	39.04	18.84	5.68
BDO IV	MET LIMIT 39oC	600 Watts	6%	0 days	39.04	18.84	5.68
BDO IV	MET LIMIT 38.5oC	105 Watts	0%	12 days	37.26	0.00	100.00
BDO IV	MET LIMIT 38.5oC	105 Watts	0%	8 days	37.29	0.00	100.00
BDO IV	MET LIMIT 38.5oC	105 Watts	0%	4 days	37.40	0.00	100.00
BDO IV	MET LIMIT 38.5oC	105 Watts	0%	0 days	37.79	.05	99.95
BDO IV	MET LIMIT 38.5oC	105 Watts	2%	12 days	37.65	.02	99.98
BDO IV	MET LIMIT 38.5oC	105 Watts	2%	8 days	37.72	.03	99.97
BDO IV	MET LIMIT 38.5oC	105 Watts	2%	4 days	37.84	.07	99.93
BDO IV	MET LIMIT 38.5oC	105 Watts	2%	0 days	38.14	.43	99.57
BDO IV	MET LIMIT 38.5oC	105 Watts	4%	12 days	38.19	.59	99.41
BDO IV	MET LIMIT 38.5oC	105 Watts	4%	8 days	38.26	.85	99.15
BDO IV	MET LIMIT 38.5oC	105 Watts	4%	4 days	38.36	1.40	98.60
BDO IV	MET LIMIT 38.5oC	105 Watts	4%	0 days	38.48	2.52	97.48
BDO IV	MET LIMIT 38.5oC	105 Watts	6%	12 days	38.83	9.86	90.14
BDO IV	MET LIMIT 38.5oC	105 Watts	6%	8 days	38.83	9.86	90.14
BDO IV	MET LIMIT 38.5oC	105 Watts	6%	4 days	38.83	9.86	90.14
BDO IV	MET LIMIT 38.5oC	105 Watts	6%	0 days	38.83	9.86	90.14
BDO IV	MET LIMIT 38.5oC	150 Watts	0%	12 days	37.50	.01	99.99
BDO IV	MET LIMIT 38.5oC	150 Watts	0%	8 days	37.54	.01	99.99
BDO IV	MET LIMIT 38.5oC	150 Watts	0%	4 days	37.67	.02	99.98
BDO IV	MET LIMIT 38.5oC	150 Watts	0%	0 days	38.11	.37	99.63
BDO IV	MET LIMIT 38.5oC	150 Watts	2%	12 days	37.90	.11	99.89
BDO IV	MET LIMIT 38.5oC	150 Watts	2%	8 days	37.98	.17	99.83
BDO IV	MET LIMIT 38.5oC	150 Watts	2%	4 days	38.13	.42	99.58
BDO IV	MET LIMIT 38.5oC	150 Watts	2%	0 days	38.45	2.22	97.78
BDO IV	MET LIMIT 38.5oC	150 Watts	4%	12 days	38.48	2.43	97.57
BDO IV	MET LIMIT 38.5oC	150 Watts	4%	8 days	38.50	2.75	91.42
BDO IV	MET LIMIT 38.5oC	150 Watts	4%	4 days	38.53	3.10	62.99
BDO IV	MET LIMIT 38.5oC	150 Watts	4%	0 days	38.53	3.11	25.19
BDO IV	MET LIMIT 38.5oC	150 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	150 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	150 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	150 Watts	6%	0 days	38.83	9.86	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDO IV	MET LIMIT 38.5oC	300 Watts	0%	12 days	38.41	1.77	98.23
BDO IV	MET LIMIT 38.5oC	300 Watts	0%	8 days	38.46	2.30	97.70
BDO IV	MET LIMIT 38.5oC	300 Watts	0%	4 days	38.54	3.17	93.93
BDO IV	MET LIMIT 38.5oC	300 Watts	0%	0 days	38.54	3.18	53.25
BDO IV	MET LIMIT 38.5oC	300 Watts	2%	12 days	38.54	3.17	79.40
BDO IV	MET LIMIT 38.5oC	300 Watts	2%	8 days	38.53	3.16	71.66
BDO IV	MET LIMIT 38.5oC	300 Watts	2%	4 days	38.53	3.12	56.19
BDO IV	MET LIMIT 38.5oC	300 Watts	2%	0 days	38.53	3.11	29.07
BDO IV	MET LIMIT 38.5oC	300 Watts	4%	12 days	38.53	3.07	28.11
BDO IV	MET LIMIT 38.5oC	300 Watts	4%	8 days	38.50	2.75	22.37
BDO IV	MET LIMIT 38.5oC	300 Watts	4%	4 days	38.53	3.10	14.54
BDO IV	MET LIMIT 38.5oC	300 Watts	4%	0 days	38.53	3.11	5.81
BDO IV	MET LIMIT 38.5oC	300 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	300 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	300 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	300 Watts	6%	0 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	400 Watts	0%	12 days	38.53	3.12	74.60
BDO IV	MET LIMIT 38.5oC	400 Watts	0%	8 days	38.53	3.16	71.66
BDO IV	MET LIMIT 38.5oC	400 Watts	0%	4 days	38.54	3.17	61.97
BDO IV	MET LIMIT 38.5oC	400 Watts	0%	0 days	38.54	3.18	34.86
BDO IV	MET LIMIT 38.5oC	400 Watts	2%	12 days	38.56	3.47	52.13
BDO IV	MET LIMIT 38.5oC	400 Watts	2%	8 days	38.53	3.16	47.45
BDO IV	MET LIMIT 38.5oC	400 Watts	2%	4 days	38.53	3.12	46.50
BDO IV	MET LIMIT 38.5oC	400 Watts	2%	0 days	38.53	3.11	19.38
BDO IV	MET LIMIT 38.5oC	400 Watts	4%	12 days	38.53	3.07	18.42
BDO IV	MET LIMIT 38.5oC	400 Watts	4%	8 days	38.53	3.08	14.54
BDO IV	MET LIMIT 38.5oC	400 Watts	4%	4 days	38.53	3.10	9.69
BDO IV	MET LIMIT 38.5oC	400 Watts	4%	0 days	38.53	3.11	3.88
BDO IV	MET LIMIT 38.5oC	400 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	400 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	400 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	400 Watts	6%	0 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	500 Watts	0%	12 days	38.53	3.12	56.19
BDO IV	MET LIMIT 38.5oC	500 Watts	0%	8 days	38.53	3.16	53.26
BDO IV	MET LIMIT 38.5oC	500 Watts	0%	4 days	38.54	3.17	46.48
BDO IV	MET LIMIT 38.5oC	500 Watts	0%	0 days	38.54	3.18	26.14
BDO IV	MET LIMIT 38.5oC	500 Watts	2%	12 days	38.54	3.17	39.70
BDO IV	MET LIMIT 38.5oC	500 Watts	2%	8 days	38.53	3.16	34.86
BDO IV	MET LIMIT 38.5oC	500 Watts	2%	4 days	38.53	3.12	27.13
BDO IV	MET LIMIT 38.5oC	500 Watts	2%	0 days	38.53	3.11	14.53
BDO IV	MET LIMIT 38.5oC	500 Watts	4%	12 days	38.53	3.07	14.54
BDO IV	MET LIMIT 38.5oC	500 Watts	4%	8 days	38.53	3.08	10.66
BDO IV	MET LIMIT 38.5oC	500 Watts	4%	4 days	38.53	3.10	6.78
BDO IV	MET LIMIT 38.5oC	500 Watts	4%	0 days	38.53	3.11	2.91
BDO IV	MET LIMIT 38.5oC	500 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	500 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	500 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	500 Watts	6%	0 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	600 Watts	0%	12 days	38.53	3.12	44.56
BDO IV	MET LIMIT 38.5oC	600 Watts	0%	8 days	38.53	3.16	42.61
BDO IV	MET LIMIT 38.5oC	600 Watts	0%	4 days	38.54	3.17	36.80
BDO IV	MET LIMIT 38.5oC	600 Watts	0%	0 days	38.54	3.18	21.30
BDO IV	MET LIMIT 38.5oC	600 Watts	2%	12 days	38.54	3.17	30.99
BDO IV	MET LIMIT 38.5oC	600 Watts	2%	8 days	38.53	3.16	28.08
BDO IV	MET LIMIT 38.5oC	600 Watts	2%	4 days	38.53	3.12	22.28
BDO IV	MET LIMIT 38.5oC	600 Watts	2%	0 days	38.53	3.11	11.63
BDO IV	MET LIMIT 38.5oC	600 Watts	4%	12 days	38.53	3.07	11.63
BDO IV	MET LIMIT 38.5oC	600 Watts	4%	8 days	38.53	3.08	8.72
BDO IV	MET LIMIT 38.5oC	600 Watts	4%	4 days	38.53	3.10	5.81
BDO IV	MET LIMIT 38.5oC	600 Watts	4%	0 days	38.53	3.11	1.94
BDO IV	MET LIMIT 38.5oC	600 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	600 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	600 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38.5oC	600 Watts	6%	0 days	38.83	9.86	0.00

117

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDO IV	MET LIMIT 38oC	105 Watts	0%	12 days	37.26	0.00	100.00
BDO IV	MET LIMIT 38oC	105 Watts	0%	8 days	37.29	0.00	100.00
BDO IV	MET LIMIT 38oC	105 Watts	0%	4 days	37.40	0.00	100.00
BDO IV	MET LIMIT 38oC	105 Watts	0%	0 days	37.79	.05	99.95
BDO IV	MET LIMIT 38oC	105 Watts	2%	12 days	37.65	.02	99.98
BDO IV	MET LIMIT 38oC	105 Watts	2%	8 days	37.72	.03	99.97
BDO IV	MET LIMIT 38oC	105 Watts	2%	4 days	37.84	.07	99.93
BDO IV	MET LIMIT 38oC	105 Watts	2%	0 days	38.14	.43	99.57
BDO IV	MET LIMIT 38oC	105 Watts	4%	12 days	38.19	.59	99.41
BDO IV	MET LIMIT 38oC	105 Watts	4%	8 days	38.26	.85	99.15
BDO IV	MET LIMIT 38oC	105 Watts	4%	4 days	38.36	1.40	98.60
BDO IV	MET LIMIT 38oC	105 Watts	4%	0 days	38.48	2.52	97.48
BDO IV	MET LIMIT 38oC	105 Watts	6%	12 days	38.83	9.86	90.14
BDO IV	MET LIMIT 38oC	105 Watts	6%	8 days	38.83	9.86	90.14
BDO IV	MET LIMIT 38oC	105 Watts	6%	4 days	38.83	9.86	90.14
BDO IV	MET LIMIT 38oC	105 Watts	6%	0 days	38.83	9.86	90.14
BDO IV	MET LIMIT 38oC	150 Watts	0%	12 days	37.50	.01	99.99
BDO IV	MET LIMIT 38oC	150 Watts	0%	8 days	37.54	.01	99.99
BDO IV	MET LIMIT 38oC	150 Watts	0%	4 days	37.67	.02	99.98
BDO IV	MET LIMIT 38oC	150 Watts	0%	0 days	38.02	.22	84.81
BDO IV	MET LIMIT 38oC	150 Watts	2%	12 days	37.90	.11	99.89
BDO IV	MET LIMIT 38oC	150 Watts	2%	8 days	37.98	.17	99.83
BDO IV	MET LIMIT 38oC	150 Watts	2%	4 days	38.02	.22	72.84
BDO IV	MET LIMIT 38oC	150 Watts	2%	0 days	38.14	.43	0.00
BDO IV	MET LIMIT 38oC	150 Watts	4%	12 days	38.19	.59	0.00
BDO IV	MET LIMIT 38oC	150 Watts	4%	8 days	38.26	.85	0.00
BDO IV	MET LIMIT 38oC	150 Watts	4%	4 days	38.36	1.40	0.00
BDO IV	MET LIMIT 38oC	150 Watts	4%	0 days	38.48	2.52	0.00
BDO IV	MET LIMIT 38oC	150 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	150 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	150 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	150 Watts	6%	0 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	300 Watts	0%	12 days	38.02	.23	74.83
BDO IV	MET LIMIT 38oC	300 Watts	0%	8 days	38.02	.23	70.84
BDO IV	MET LIMIT 38oC	300 Watts	0%	4 days	38.03	.23	56.87
BDO IV	MET LIMIT 38oC	300 Watts	0%	0 days	38.02	.22	19.96
BDO IV	MET LIMIT 38oC	300 Watts	2%	12 days	38.02	.22	37.92
BDO IV	MET LIMIT 38oC	300 Watts	2%	8 days	38.02	.22	29.93
BDO IV	MET LIMIT 38oC	300 Watts	2%	4 days	38.02	.22	16.96
BDO IV	MET LIMIT 38oC	300 Watts	2%	0 days	38.14	.43	0.00
BDO IV	MET LIMIT 38oC	300 Watts	4%	12 days	38.19	.59	0.00
BDO IV	MET LIMIT 38oC	300 Watts	4%	8 days	38.26	.85	0.00
BDO IV	MET LIMIT 38oC	300 Watts	4%	4 days	38.36	1.40	0.00
BDO IV	MET LIMIT 38oC	300 Watts	4%	0 days	38.48	2.52	0.00
BDO IV	MET LIMIT 38oC	300 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	300 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	300 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	300 Watts	6%	0 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	400 Watts	0%	12 days	38.02	.23	49.89
BDO IV	MET LIMIT 38oC	400 Watts	0%	8 days	38.02	.23	46.89
BDO IV	MET LIMIT 38oC	400 Watts	0%	4 days	38.03	.23	36.91
BDO IV	MET LIMIT 38oC	400 Watts	0%	0 days	38.02	.22	12.97
BDO IV	MET LIMIT 38oC	400 Watts	2%	12 days	38.02	.22	24.95
BDO IV	MET LIMIT 38oC	400 Watts	2%	8 days	38.02	.22	19.96
BDO IV	MET LIMIT 38oC	400 Watts	2%	4 days	38.02	.22	10.98
BDO IV	MET LIMIT 38oC	400 Watts	2%	0 days	38.14	.43	0.00
BDO IV	MET LIMIT 38oC	400 Watts	4%	12 days	38.19	.59	0.00
BDO IV	MET LIMIT 38oC	400 Watts	4%	8 days	38.26	.85	0.00
BDO IV	MET LIMIT 38oC	400 Watts	4%	4 days	38.36	1.40	0.00
BDO IV	MET LIMIT 38oC	400 Watts	4%	0 days	38.48	2.52	0.00
BDO IV	MET LIMIT 38oC	400 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	400 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	400 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	400 Watts	6%	0 days	38.83	9.86	0.00

﹕ching	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDO IV	MET LIMIT 38oC	500 Watts	0%	12 days	38.02	.23	36.91
BDO IV	MET LIMIT 38oC	500 Watts	0%	8 days	38.02	.23	34.92
BDO IV	MET LIMIT 38oC	500 Watts	0%	4 days	38.03	.23	27.94
BDO IV	MET LIMIT 38oC	500 Watts	0%	0 days	38.02	.22	9.98
BDO IV	MET LIMIT 38oC	500 Watts	2%	12 days	38.02	.22	18.96
BDC IV	MET LIMIT 38oC	500 Watts	2%	8 days	38.02	.22	14.97
BC3 IV	MET LIMIT 38oC	500 Watts	2%	4 days	38.02	.22	7.98
BDO IV	MET LIMIT 38oC	500 Watts	2%	0 days	38.14	.43	0.00
BDO IV	MET LIMIT 38oC	500 Watts	4%	12 days	38.19	.59	0.00
BDO IV	MET LIMIT 38oC	500 Watts	4%	8 days	38.26	.85	0.00
BDO IV	MET LIMIT 38oC	500 Watts	4%	4 days	38.36	1.40	0.00
BDO IV	MET LIMIT 38oC	500 Watts	4%	0 days	38.48	2.52	0.00
BDO IV	MET LIMIT 38oC	500 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	500 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	500 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	500 Watts	6%	0 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	600 Watts	0%	12 days	38.02	.23	29.93
BDO IV	MET LIMIT 38oC	600 Watts	0%	8 days	38.02	.23	27.94
BDO IV	MET LIMIT 38oC	600 Watts	0%	4 days	38.03	.23	21.95
BDO IV	MET LIMIT 38oC	600 Watts	0%	0 days	38.02	.22	7.98
BDO IV	MET LIMIT 38oC	600 Watts	2%	12 days	38.02	.22	14.97
BDO IV	MET LIMIT 38oC	600 Watts	2%	8 days	38.02	.22	11.97
BDO IV	MET LIMIT 38oC	600 Watts	2%	4 days	38.02	.22	6.98
BDO IV	MET LIMIT 38oC	600 Watts	2%	0 days	38.14	.43	0.00
BDO IV	MET LIMIT 38oC	600 Watts	4%	12 days	38.19	.59	0.00
BDO IV	MET LIMIT 38oC	600 Watts	4%	8 days	38.26	.85	0.00
BDO IV	MET LIMIT 38oC	600 Watts	4%	4 days	38.36	1.40	0.00
BDO IV	MET LIMIT 38oC	600 Watts	4%	0 days	38.48	2.52	0.00
BDO IV	MET LIMIT 38oC	600 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	600 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	600 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	MET LIMIT 38oC	600 Watts	6%	0 days	38.83	9.86	0.00
BDO IV	FM 21-40	105 Watts	0%	12 days	37.26	0.00	100.00
BDO IV	FM 21-40	105 Watts	0%	8 days	37.29	0.00	100.00
BDO IV	FM 21-40	105 Watts	0%	4 days	37.40	0.00	100.00
BDO IV	FM 21-40	105 Watts	0%	0 days	37.79	.05	99.95
BDO IV	FM 21-40	105 Watts	2%	12 days	37.65	.02	99.98
BDO IV	FM 21-40	105 Watts	2%	8 days	37.72	.03	99.97
BDO IV	FM 21-40	105 Watts	2%	4 days	37.84	.07	99.93
BDO IV	FM 21-40	105 Watts	2%	0 days	38.14	.43	99.57
BDO IV	FM 21-40	105 Watts	4%	12 days	38.19	.59	99.41
BDO IV	FM 21-40	105 Watts	4%	8 days	38.26	.85	99.15
BDO IV	FM 21-40	105 Watts	4%	4 days	38.36	1.40	98.60
BDO IV	FM 21-40	105 Watts	4%	0 days	38.48	2.52	97.48
BDO IV	FM 21-40	105 Watts	6%	12 days	38.83	9.86	90.14
BDO IV	FM 21-40	105 Watts	6%	8 days	38.83	9.86	90.14
BDO IV	FM 21-40	105 Watts	6%	4 days	38.83	9.86	90.14
BDO IV	FM 21-40	105 Watts	6%	0 days	38.83	9.86	90.14
BDO IV	FM 21-40	150 Watts	0%	12 days	37.35	0.00	29.00
BDO IV	FM 21-40	150 Watts	0%	8 days	37.38	0.00	29.00
BDO IV	FM 21-40	150 Watts	0%	4 days	37.30	.01	29.00
BDO IV	FM 21-40	150 Watts	0%	0 days	37.91	.11	28.97
BDO IV	FM 21-40	150 Watts	2%	12 days	37.74	.04	28.99
BDO IV	FM 21-40	150 Watts	2%	8 days	37.81	.06	28.98
BDO IV	FM 21-40	150 Watts	2%	4 days	37.95	.14	28.96
BDO IV	FM 21-40	150 Watts	2%	0 days	38.26	.83	28.76
BDO IV	FM 21-40	150 Watts	4%	12 days	38.30	1.04	28.70
BDO IV	FM 21-40	150 Watts	4%	8 days	38.37	1.49	28.57
BDO IV	FM 21-40	150 Watts	4%	4 days	38.47	2.38	28.31
BDO IV	FM 21-40	150 Watts	4%	0 days	38.60	4.21	27.78
BDO IV	FM 21-40	150 Watts	6%	12 days	38.95	14.48	24.80
BDO IV	FM 21-40	150 Watts	6%	8 days	38.95	14.48	24.80
BDO IV	FM 21-40	150 Watts	6%	4 days	38.95	14.48	24.80
BDO IV	FM 21-40	150 Watts	6%	0 days	38.95	14.48	24.80

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDO IV	FM 21-40	300 Watts	0%	12 days	37.26	0.00	0.00
BDO IV	FM 21-40	300 Watts	0%	8 days	37.29	0.00	0.00
BDO IV	FM 21-40	300 Watts	0%	4 days	37.40	0.00	0.00
BDO IV	FM 21-40	300 Watts	0%	0 days	37.79	.05	0.00
BDO IV	FM 21-40	300 Watts	2%	12 days	37.65	.02	0.00
BDO IV	FM 21-40	300 Watts	2%	8 days	37.72	.03	0.00
BDO IV	FM 21-40	300 Watts	2%	4 days	37.84	.07	0.00
BDO IV	FM 21-40	300 Watts	2%	0 days	38.14	.43	0.00
BDO IV	FM 21-40	300 Watts	4%	12 days	38.19	.59	0.00
BDO IV	FM 21-40	300 Watts	4%	8 days	38.26	.85	0.00
BDO IV	FM 21-40	300 Watts	4%	4 days	38.36	1.40	0.00
BDO IV	FM 21-40	300 Watts	4%	0 days	38.48	2.52	0.00
BDO IV	FM 21-40	300 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	FM 21-40	300 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	FM 21-40	300 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	FM 21-40	300 Watts	6%	0 days	38.83	9.86	0.00
BDO IV	FM 21-40	400 Watts	0%	12 days	37.26	0.00	0.00
BDO IV	FM 21-40	400 Watts	0%	8 days	37.29	0.00	0.00
BDO IV	FM 21-40	400 Watts	0%	4 days	37.40	0.00	0.00
BDO IV	FM 21-40	400 Watts	0%	0 days	37.79	.05	0.00
BDO IV	FM 21-40	400 Watts	2%	12 days	37.65	.02	0.00
BDO IV	FM 21-40	400 Watts	2%	8 days	37.72	.03	0.00
BDO IV	FM 21-40	400 Watts	2%	4 days	37.84	.07	0.00
BDO IV	FM 21-40	400 Watts	2%	0 days	38.14	.43	0.00
BDO IV	FM 21-40	400 Watts	4%	12 days	38.19	.59	0.00
BDO IV	FM 21-40	400 Watts	4%	8 days	38.26	.85	0.00
BDO IV	FM 21-40	400 Watts	4%	4 days	38.36	1.40	0.00
BDO IV	FM 21-40	400 Watts	4%	0 days	38.48	2.52	0.00
BDO IV	FM 21-40	400 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	FM 21-40	400 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	FM 21-40	400 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	FM 21-40	400 Watts	6%	0 days	38.83	9.86	0.00
BDO IV	FM 21-40	500 Watts	0%	12 days	37.26	0.00	0.00
BDO IV	FM 21-40	500 Watts	0%	8 days	37.29	0.00	0.00
BDO IV	FM 21-40	500 Watts	0%	4 days	37.40	0.00	0.00
BDO IV	FM 21-40	500 Watts	0%	0 days	37.79	.05	0.00
BDO IV	FM 21-40	500 Watts	2%	12 days	37.65	.02	0.00
BDO IV	FM 21-40	500 Watts	2%	8 days	37.72	.03	0.00
BDO IV	FM 21-40	500 Watts	2%	4 days	37.84	.07	0.00
BDO IV	FM 21-40	500 Watts	2%	0 days	38.14	.43	0.00
BDO IV	FM 21-40	500 Watts	4%	12 days	38.19	.59	0.00
BDO IV	FM 21-40	500 Watts	4%	8 days	38.26	.85	0.00
BDO IV	FM 21-40	500 Watts	4%	4 days	38.36	1.40	0.00
BDO IV	FM 21-40	500 Watts	4%	0 days	38.48	2.52	0.00
BDO IV	FM 21-40	500 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	FM 21-40	500 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	FM 21-40	500 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	FM 21-40	500 Watts	6%	0 days	38.83	9.86	0.00
BDO IV	FM 21-40	600 Watts	0%	12 days	37.26	0.00	0.00
BDO IV	FM 21-40	600 Watts	0%	8 days	37.29	0.00	0.00
BDO IV	FM 21-40	600 Watts	0%	4 days	37.40	0.00	0.00
BDO IV	FM 21-40	600 Watts	0%	0 days	37.79	.05	0.00
BDO IV	FM 21-40	600 Watts	2%	12 days	37.65	.02	0.00
BDO IV	FM 21-40	600 Watts	2%	8 days	37.72	.03	0.00
BDO IV	FM 21-40	600 Watts	2%	4 days	37.84	.07	0.00
BDO IV	FM 21-40	600 Watts	2%	0 days	38.14	.43	0.00
BDO IV	FM 21-40	600 Watts	4%	12 days	38.19	.59	0.00
BDO IV	FM 21-40	600 Watts	4%	8 days	38.26	.85	0.00
BDO IV	FM 21-40	600 Watts	4%	4 days	38.36	1.40	0.00
BDO IV	FM 21-40	600 Watts	4%	0 days	38.48	2.52	0.00
BDO IV	FM 21-40	600 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	FM 21-40	600 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	FM 21-40	600 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	FM 21-40	600 Watts	6%	0 days	38.83	9.86	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDO IV	FM 21-10 VARIANT	105 Watts	0%	12 days	37.26	0.00	100.00
BDO IV	FM 21-10 VARIANT	105 Watts	0%	8 days	37.29	0.00	100.00
BDO IV	FM 21-10 VARIANT	105 Watts	0%	4 days	37.40	0.00	100.00
BDO IV	FM 21-10 VARIANT	105 Watts	0%	0 days	37.79	.05	99.95
BDO IV	FM 21-10 VARIANT	105 Watts	2%	12 days	37.65	.02	99.98
BDO IV	FM 21-10 VARIANT	105 Watts	2%	8 days	37.72	.03	99.97
BDO IV	FM 21-10 VARIANT	105 Watts	2%	4 days	37.84	.07	99.93
BDO IV	FM 21-10 VARIANT	105 Watts	2%	0 days	38.14	.43	99.57
BDO IV	FM 21-10 VARIANT	105 Watts	4%	12 days	38.19	.59	99.41
BDO IV	FM 21-10 VARIANT	105 Watts	4%	8 days	38.26	.85	99.15
BDO IV	FM 21-10 VARIANT	105 Watts	4%	4 days	38.36	1.40	98.60
BDO IV	FM 21-10 VARIANT	105 Watts	4%	0 days	38.48	2.52	97.48
BDO IV	FM 21-10 VARIANT	105 Watts	6%	12 days	38.83	9.86	90.14
BDO IV	FM 21-10 VARIANT	105 Watts	6%	8 days	38.83	9.86	90.14
BDO IV	FM 21-10 VARIANT	105 Watts	6%	4 days	38.83	9.86	90.14
BDO IV	FM 21-10 VARIANT	105 Watts	6%	0 days	38.83	9.86	90.14
BDO IV	FM 21-10 VARIANT	150 Watts	0%	12 days	37.39	0.00	93.00
BDO IV	FM 21-10 VARIANT	150 Watts	0%	8 days	37.43	0.00	93.00
BDO IV	FM 21-10 VARIANT	150 Watts	0%	4 days	37.55	.01	92.99
BDO IV	FM 21-10 VARIANT	150 Watts	0%	0 days	37.94	.13	92.88
BDO IV	FM 21-10 VARIANT	150 Watts	2%	12 days	37.79	.05	92.95
BDO IV	FM 21-10 VARIANT	150 Watts	2%	8 days	37.86	.08	92.93
BDO IV	FM 21-10 VARIANT	150 Watts	2%	4 days	38.00	.19	92.82
BDO IV	FM 21-10 VARIANT	150 Watts	2%	0 days	38.28	.96	92.11
BDO IV	FM 21-10 VARIANT	150 Watts	4%	12 days	38.34	1.31	91.78
BDO IV	FM 21-10 VARIANT	150 Watts	4%	8 days	38.42	1.87	91.26
BDO IV	FM 21-10 VARIANT	150 Watts	4%	4 days	38.51	2.85	90.35
BDO IV	FM 21-10 VARIANT	150 Watts	4%	0 days	38.63	4.70	88.63
BDO IV	FM 21-10 VARIANT	150 Watts	6%	12 days	38.98	15.69	78.41
BDO IV	FM 21-10 VARIANT	150 Watts	6%	8 days	38.98	15.69	78.41
BDO IV	FM 21-10 VARIANT	150 Watts	6%	4 days	38.98	15.69	78.41
BDO IV	FM 21-10 VARIANT	150 Watts	6%	0 days	38.98	15.69	78.41
BDO IV	FM 21-10 VARIANT	300 Watts	0%	12 days	38.16	.50	92.54
BDO IV	FM 21-10 VARIANT	300 Watts	0%	8 days	38.21	.67	92.38
BDO IV	FM 21-10 VARIANT	300 Watts	0%	4 days	38.39	1.65	91.47
BDO IV	FM 21-10 VARIANT	300 Watts	0%	0 days	38.97	15.41	78.67
BDO IV	FM 21-10 VARIANT	300 Watts	2%	12 days	38.58	3.87	89.40
BDO IV	FM 21-10 VARIANT	300 Watts	2%	8 days	38.68	5.84	87.57
BDO IV	FM 21-10 VARIANT	300 Watts	2%	4 days	38.90	12.29	81.57
BDO IV	FM 21-10 VARIANT	300 Watts	2%	0 days	39.32	36.27	59.27
BDO IV	FM 21-10 VARIANT	300 Watts	4%	12 days	39.24	31.10	64.08
BDO IV	FM 21-10 VARIANT	300 Watts	4%	8 days	39.36	39.05	56.68
BDO IV	FM 21-10 VARIANT	300 Watts	4%	4 days	39.49	49.35	47.10
BDO IV	FM 21-10 VARIANT	300 Watts	4%	0 days	39.66	62.41	34.96
BDO IV	FM 21-10 VARIANT	300 Watts	6%	12 days	40.01	83.74	15.12
BDO IV	FM 21-10 VARIANT	300 Watts	6%	8 days	40.01	83.74	15.12
BDO IV	FM 21-10 VARIANT	300 Watts	6%	4 days	40.01	83.74	15.12
BDO IV	FM 21-10 VARIANT	300 Watts	6%	0 days	40.01	83.74	15.12
BDO IV	FM 21-10 VARIANT	400 Watts	0%	12 days	38.77	7.91	85.64
BDO IV	FM 21-10 VARIANT	400 Watts	0%	8 days	38.83	9.90	83.79
BDO IV	FM 21-10 VARIANT	400 Watts	0%	4 days	39.04	19.06	75.27
BDO IV	FM 21-10 VARIANT	400 Watts	0%	0 days	39.75	68.64	29.16
BDO IV	FM 21-10 VARIANT	400 Watts	2%	12 days	39.20	28.37	66.62
BDO IV	FM 21-10 VARIANT	400 Watts	2%	8 days	39.33	36.91	58.67
BDO IV	FM 21-10 VARIANT	400 Watts	2%	4 days	39.58	56.27	40.67
BDO IV	FM 21-10 VARIANT	400 Watts	2%	0 days	40.10	87.56	11.57
BDO IV	FM 21-10 VARIANT	400 Watts	4%	12 days	39.93	79.54	19.03
BDO IV	FM 21-10 VARIANT	400 Watts	4%	8 days	40.07	86.15	12.88
BDO IV	FM 21-10 VARIANT	400 Watts	4%	4 days	40.24	92.24	7.22
BDO IV	FM 21-10 VARIANT	400 Watts	4%	0 days	40.45	96.57	3.19
BDO IV	FM 21-10 VARIANT	400 Watts	6%	12 days	40.79	99.36	.60
BDO IV	FM 21-10 VARIANT	400 Watts	6%	8 days	40.79	99.36	.60
BDO IV	FM 21-10 VARIANT	400 Watts	6%	4 days	40.79	99.36	.60
BDO IV	FM 21-10 VARIANT	400 Watts	6%	0 days	40.79	99.36	.60

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDO IV	FM 21-10 VARIANT	500 Watts	0%	12 days	39.47	48.03	48.33
BDO IV	FM 21-10 VARIANT	500 Watts	0%	8 days	39.55	53.71	43.05
BDO IV	FM 21-10 VARIANT	500 Watts	0%	4 days	39.80	71.55	26.46
BDO IV	FM 21-10 VARIANT	500 Watts	0%	0 days	40.63	98.55	1.35
BDO IV	FM 21-10 VARIANT	500 Watts	2%	12 days	39.92	79.28	19.27
BDO IV	FM 21-10 VARIANT	500 Watts	2%	8 days	40.07	86.24	12.80
BDO IV	FM 21-10 VARIANT	500 Watts	2%	4 days	40.36	95.16	4.50
BDO IV	FM 21-10 VARIANT	500 Watts	2%	0 days	40.98	99.78	.20
BDO IV	FM 21-10 VARIANT	500 Watts	4%	12 days	40.71	99.00	.93
BDO IV	FM 21-10 VARIANT	500 Watts	4%	8 days	40.87	99.58	.39
BDO IV	FM 21-10 VARIANT	500 Watts	4%	4 days	41.07	99.87	.12
BDO IV	FM 21-10 VARIANT	500 Watts	4%	0 days	41.33	99.98	.02
BDO IV	FM 21-10 VARIANT	500 Watts	6%	12 days	41.68	100.00	0.00
BDO IV	FM 21-10 VARIANT	500 Watts	6%	8 days	41.68	100.00	0.00
BDO IV	FM 21-10 VARIANT	500 Watts	6%	4 days	41.68	100.00	0.00
BDO IV	FM 21-10 VARIANT	500 Watts	6%	0 days	41.68	100.00	0.00
BDO IV	FM 21-10 VARIANT	600 Watts	0%	12 days	40.34	94.69	4.94
BDO IV	FM 21-10 VARIANT	600 Watts	0%	8 days	40.42	96.21	3.52
BDO IV	FM 21-10 VARIANT	600 Watts	0%	4 days	40.70	98.96	.97
BDO IV	FM 21-10 VARIANT	600 Watts	0%	0 days	41.65	100.00	0.00
BDO IV	FM 21-10 VARIANT	600 Watts	2%	12 days	40.80	99.39	.57
BDO IV	FM 21-10 VARIANT	600 Watts	2%	8 days	40.96	99.76	.22
BDO IV	FM 21-10 VARIANT	600 Watts	2%	4 days	41.30	99.97	.03
BDO IV	FM 21-10 VARIANT	600 Watts	2%	0 days	42.00	100.00	0.00
BDO IV	FM 21-10 VARIANT	600 Watts	4%	12 days	41.64	100.00	0.00
BDO IV	FM 21-10 VARIANT	600 Watts	4%	8 days	41.82	100.00	0.00
BDO IV	FM 21-10 VARIANT	600 Watts	4%	4 days	42.05	100.00	0.00
BDO IV	FM 21-10 VARIANT	600 Watts	4%	0 days	42.35	100.00	0.00
BDO IV	FM 21-10 VARIANT	600 Watts	6%	12 days	42.69	100.00	0.00
BDO IV	FM 21-10 VARIANT	600 Watts	6%	8 days	42.69	100.00	0.00
BDO IV	FM 21-10 VARIANT	600 Watts	6%	4 days	42.69	100.00	0.00
BDO IV	FM 21-10 VARIANT	600 Watts	6%	0 days	42.69	100.00	0.00
BDO IV	FM 21-40 VARIANT	105 Watts	0%	12 days	37.26	0.00	100.00
BDO IV	FM 21-40 VARIANT	105 Watts	0%	8 days	37.29	0.00	100.00
BDO IV	FM 21-40 VARIANT	105 Watts	0%	4 days	37.40	0.00	100.00
BDO IV	FM 21-40 VARIANT	105 Watts	0%	0 days	37.79	.05	99.95
BDO IV	FM 21-40 VARIANT	105 Watts	2%	12 days	37.65	.02	99.98
BDO IV	FM 21-40 VARIANT	105 Watts	2%	8 days	37.72	.03	99.97
BDO IV	FM 21-40 VARIANT	105 Watts	2%	4 days	37.84	.07	99.93
BDO IV	FM 21-40 VARIANT	105 Watts	2%	0 days	38.14	.43	99.57
BDO IV	FM 21-40 VARIANT	105 Watts	4%	12 days	38.19	.59	99.41
BDO IV	FM 21-40 VARIANT	105 Watts	4%	8 days	38.26	.85	99.15
BDO IV	FM 21-40 VARIANT	105 Watts	4%	4 days	38.36	1.40	98.60
BDO IV	FM 21-40 VARIANT	105 Watts	4%	0 days	38.48	2.52	97.48
BDO IV	FM 21-40 VARIANT	105 Watts	6%	12 days	38.83	9.86	90.14
BDO IV	FM 21-40 VARIANT	105 Watts	6%	8 days	38.83	9.86	90.14
BDO IV	FM 21-40 VARIANT	105 Watts	6%	4 days	38.83	9.86	90.14
BDO IV	FM 21-40 VARIANT	105 Watts	6%	0 days	38.83	9.86	90.14
BDO IV	FM 21-40 VARIANT	150 Watts	0%	12 days	37.37	0.00	38.00
BDO IV	FM 21-40 VARIANT	150 Watts	0%	8 days	37.41	0.00	38.00
BDO IV	FM 21-40 VARIANT	150 Watts	0%	4 days	37.52	.01	38.00
BDO IV	FM 21-40 VARIANT	150 Watts	0%	0 days	37.91	.11	37.96
BDO IV	FM 21-40 VARIANT	150 Watts	2%	12 days	37.77	.04	37.98
BDO IV	FM 21-40 VARIANT	150 Watts	2%	8 days	37.83	.07	37.97
BDO IV	FM 21-40 VARIANT	150 Watts	2%	4 days	37.97	.16	37.94
BDO IV	FM 21-40 VARIANT	150 Watts	2%	0 days	38.25	.83	37.68
BDO IV	FM 21-40 VARIANT	150 Watts	4%	12 days	38.32	1.15	37.56
BDO IV	FM 21-40 VARIANT	150 Watts	4%	8 days	38.39	1.63	37.38
BDO IV	FM 21-40 VARIANT	150 Watts	4%	4 days	38.48	2.50	37.05
BDO IV	FM 21-40 VARIANT	150 Watts	4%	0 days	38.61	4.19	36.41
BDO IV	FM 21-40 VARIANT	150 Watts	6%	12 days	38.95	14.41	32.52
BDO IV	FM 21-40 VARIANT	150 Watts	6%	8 days	38.95	14.41	32.52
BDO IV	FM 21-40 VARIANT	150 Watts	6%	4 days	38.95	14.41	32.52
BDO IV	FM 21-40 VARIANT	150 Watts	6%	0 days	38.95	14.41	32.52

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDO IV	FM 21-40 VARIANT	300 Watts	0%	12 days	37.69	.02	17.00
BDO IV	FM 21-40 VARIANT	300 Watts	0%	8 days	37.73	.03	16.99
BDO IV	FM 21-40 VARIANT	300 Watts	0%	4 days	37.97	.09	16.98
BDO IV	FM 21-40 VARIANT	300 Watts	0%	0 days	38.37	1.48	16.75
BDO IV	FM 21-40 VARIANT	300 Watts	2%	12 days	38.09	.34	16.94
BDO IV	FM 21-40 VARIANT	300 Watts	2%	8 days	38.18	.55	16.91
BDO IV	FM 21-40 VARIANT	300 Watts	2%	4 days	38.35	1.35	16.77
BDO IV	FM 21-40 VARIANT	300 Watts	2%	0 days	38.72	6.56	15.88
BDO IV	FM 21-40 VARIANT	300 Watts	4%	12 days	38.70	6.14	15.96
BDO IV	FM 21-40 VARIANT	300 Watts	4%	8 days	38.79	8.62	15.53
BDO IV	FM 21-40 VARIANT	300 Watts	4%	4 days	38.91	12.80	14.82
BDO IV	FM 21-40 VARIANT	300 Watts	4%	0 days	39.06	19.98	13.60
BDO IV	FM 21-40 VARIANT	300 Watts	6%	12 days	39.41	43.06	9.68
BDO IV	FM 21-40 VARIANT	300 Watts	6%	8 days	39.41	43.06	9.68
BDO IV	FM 21-40 VARIANT	300 Watts	6%	4 days	39.41	43.06	9.68
BDO IV	FM 21-40 VARIANT	300 Watts	6%	0 days	39.41	43.06	9.68
BDO IV	FM 21-40 VARIANT	400 Watts	0%	12 days	37.98	.17	16.97
BDO IV	FM 21-40 VARIANT	400 Watts	0%	8 days	38.03	.24	16.96
BDO IV	FM 21-40 VARIANT	400 Watts	0%	4 days	38.20	.61	16.90
BDO IV	FM 21-40 VARIANT	400 Watts	0%	0 days	38.76	7.83	15.67
BDO IV	FM 21-40 VARIANT	400 Watts	2%	12 days	38.40	1.69	16.71
BDO IV	FM 21-40 VARIANT	400 Watts	2%	8 days	38.49	2.63	16.55
BDO IV	FM 21-40 VARIANT	400 Watts	2%	4 days	38.69	5.99	15.98
BDO IV	FM 21-40 VARIANT	400 Watts	2%	0 days	39.11	22.68	13.14
BDO IV	FM 21-40 VARIANT	400 Watts	4%	12 days	39.04	18.70	13.82
BDO IV	FM 21-40 VARIANT	400 Watts	4%	8 days	39.14	24.69	12.80
BDO IV	FM 21-40 VARIANT	400 Watts	4%	4 days	39.28	33.68	11.27
BDO IV	FM 21-40 VARIANT	400 Watts	4%	0 days	39.46	46.72	9.06
BDO IV	FM 21-40 VARIANT	400 Watts	6%	12 days	39.80	72.06	4.75
BDO IV	FM 21-40 VARIANT	400 Watts	6%	8 days	39.80	72.06	4.75
BDO IV	FM 21-40 VARIANT	400 Watts	6%	4 days	39.80	72.06	4.75
BDO IV	FM 21-40 VARIANT	400 Watts	6%	0 days	39.80	72.06	4.75
BDO IV	FM 21-40 VARIANT	500 Watts	0%	12 days	37.26	0.00	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	0%	8 days	37.29	0.00	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	0%	4 days	37.40	0.00	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	0%	0 days	37.79	.05	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	2%	12 days	37.65	.02	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	2%	8 days	37.72	.03	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	2%	4 days	37.84	.07	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	2%	0 days	38.14	.43	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	4%	12 days	38.19	.59	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	4%	8 days	38.26	.85	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	4%	4 days	38.36	1.40	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	4%	0 days	38.48	2.52	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	FM 21-40 VARIANT	500 Watts	6%	0 days	38.83	9.86	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	0%	12 days	37.26	0.00	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	0%	8 days	37.29	0.00	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	0%	4 days	37.40	0.00	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	0%	0 days	37.79	.05	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	2%	12 days	37.65	.02	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	2%	8 days	37.72	.03	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	2%	4 days	37.84	.07	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	2%	0 days	38.14	.43	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	4%	12 days	38.19	.59	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	4%	8 days	38.26	.85	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	4%	4 days	38.36	1.40	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	4%	0 days	38.48	2.52	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	6%	12 days	38.83	9.86	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	6%	8 days	38.83	9.86	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	6%	4 days	38.83	9.86	0.00
BDO IV	FM 21-40 VARIANT	600 Watts	6%	0 days	38.83	9.86	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU+BDO IV	NONE	105 Watts	0%	12 days	37.55	.01	99.99
BDU+BDO IV	NONE	105 Watts	0%	8 days	37.59	.01	99.99
BDU+BDO IV	NONE	105 Watts	0%	4 days	37.70	.03	99.97
BDU+BDO IV	NONE	105 Watts	0%	0 days	38.09	.32	99.68
BDU+BDO IV	NONE	105 Watts	2%	12 days	37.95	.14	99.86
BDU+BDO IV	NONE	105 Watts	2%	8 days	38.02	.22	99.78
BDU+BDO IV	NONE	105 Watts	2%	4 days	38.15	.48	99.52
BDU+BDO IV	NONE	105 Watts	2%	0 days	38.43	2.00	98.00
BDU+BDO IV	NONE	105 Watts	4%	12 days	38.50	2.71	97.29
BDU+BDO IV	NONE	105 Watts	4%	8 days	38.57	3.70	96.30
BDU+BDO IV	NONE	105 Watts	4%	4 days	38.66	5.36	94.64
BDU+BDO IV	NONE	105 Watts	4%	0 days	38.78	8.27	91.73
BDU+BDO IV	NONE	105 Watts	6%	12 days	39.13	23.60	76.40
BDU+BDO IV	NONE	105 Watts	6%	8 days	39.13	23.60	76.40
BDU+BDO IV	NONE	105 Watts	6%	4 days	39.13	23.60	76.40
BDU+BDO IV	NONE	105 Watts	6%	0 days	39.13	23.60	76.40
BDU+BDO IV	NONE	150 Watts	0%	12 days	37.86	.08	99.92
BDU+BDO IV	NONE	150 Watts	0%	8 days	37.90	.10	99.90
BDU+BDO IV	NONE	150 Watts	0%	4 days	38.03	.24	99.76
BDU+BDO IV	NONE	150 Watts	0%	0 days	38.47	2.42	97.58
BDU+BDO IV	NONE	150 Watts	2%	12 days	38.26	.87	99.13
BDU+BDO IV	NONE	150 Watts	2%	8 days	38.34	1.28	98.72
BDU+BDO IV	NONE	150 Watts	2%	4 days	38.50	2.69	97.31
BDU+BDO IV	NONE	150 Watts	2%	0 days	38.82	9.58	90.42
BDU+BDO IV	NONE	150 Watts	4%	12 days	38.84	10.36	89.64
BDU+BDO IV	NONE	150 Watts	4%	8 days	38.93	13.54	86.46
BDU+BDO IV	NONE	150 Watts	4%	4 days	39.03	18.48	81.52
BDU+BDO IV	NONE	150 Watts	4%	0 days	39.17	26.16	73.84
BDU+BDO IV	NONE	150 Watts	6%	12 days	39.52	51.16	48.84
BDU+BDO IV	NONE	150 Watts	6%	8 days	39.52	51.16	48.84
BDU+BDO IV	NONE	150 Watts	6%	4 days	39.52	51.16	48.84
BDU+BDO IV	NONE	150 Watts	6%	0 days	39.52	51.16	48.84
BDU+BDO IV	NONE	300 Watts	0%	12 days	39.13	23.60	76.40
BDU+BDO IV	NONE	300 Watts	0%	8 days	39.18	27.04	72.96
BDU+BDO IV	NONE	300 Watts	0%	4 days	39.37	39.92	60.08
BDU+BDO IV	NONE	300 Watts	0%	0 days	39.98	82.32	17.68
BDU+BDO IV	NONE	300 Watts	2%	12 days	39.55	53.88	46.12
BDU+BDO IV	NONE	300 Watts	2%	8 days	39.66	61.92	38.08
BDU+BDO IV	NONE	300 Watts	2%	4 days	39.88	76.62	23.38
BDU+BDO IV	NONE	300 Watts	2%	0 days	40.33	94.47	5.53
BDU+BDO IV	NONE	300 Watts	4%	12 days	40.22	91.83	8.17
BDU+BDO IV	NONE	300 Watts	4%	8 days	40.34	94.71	5.29
BDU+BDO IV	NONE	300 Watts	4%	4 days	40.49	97.14	2.86
BDU+BDO IV	NONE	300 Watts	4%	0 days	40.68	98.82	1.18
BDU+BDO IV	NONE	300 Watts	6%	12 days	41.02	99.83	.17
BDU+BDO IV	NONE	300 Watts	6%	8 days	41.02	99.83	.17
BDU+BDO IV	NONE	300 Watts	6%	4 days	41.02	99.83	.17
BDU+BDO IV	NONE	300 Watts	6%	0 days	41.02	99.83	.17
BDU+BDO IV	NONE	400 Watts	0%	12 days	40.30	93.79	6.21
BDU+BDO IV	NONE	400 Watts	0%	8 days	40.36	95.16	4.84
BDU+BDO IV	NONE	400 Watts	0%	4 days	40.58	98.08	1.92
BDU+BDO IV	NONE	400 Watts	0%	0 days	41.28	99.97	.03
BDU+BDO IV	NONE	400 Watts	2%	12 days	40.74	99.13	.87
BDU+BDO IV	NONE	400 Watts	2%	8 days	40.86	99.55	.45
BDU+BDO IV	NONE	400 Watts	2%	4 days	41.11	99.90	.10
BDU+BDO IV	NONE	400 Watts	2%	0 days	41.63	100.00	0.00
BDU+BDO IV	NONE	400 Watts	4%	12 days	41.46	99.99	.01
BDU+BDO IV	NONE	400 Watts	4%	8 days	41.59	100.00	0.00
BDU+BDO IV	NONE	400 Watts	4%	4 days	41.76	100.00	0.00
BDU+BDO IV	NONE	400 Watts	4%	0 days	41.98	100.00	0.00
BDU+BDO IV	NONE	400 Watts	6%	12 days	42.32	100.00	0.00
BDU+BDO IV	NONE	400 Watts	6%	8 days	42.32	100.00	0.00
BDU+BDO IV	NONE	400 Watts	6%	4 days	42.32	100.00	0.00
BDU+BDO IV	NONE	400 Watts	6%	0 days	42.32	100.00	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU+BDO IV	NONE	500 Watts	0%	12 days	41.92	100.00	0.00
BDU+BDO IV	NONE	500 Watts	0%	8 days	41.99	100.00	0.00
BDU+BDO IV	NONE	500 Watts	0%	4 days	42.22	100.00	0.00
BDU+BDO IV	NONE	500 Watts	0%	0 days	42.99	100.00	0.00
BDU+BDO IV	NONE	500 Watts	2%	12 days	42.36	100.00	0.00
BDU+BDO IV	NONE	500 Watts	2%	8 days	42.50	100.00	0.00
BDU+BDO IV	NONE	500 Watts	2%	4 days	42.77	100.00	0.00
BDU+BDO IV	NONE	500 Watts	2%	0 days	43.34	100.00	0.00
BDU+BDO IV	NONE	500 Watts	4%	12 days	43.12	100.00	0.00
BDU+BDO IV	NONE	500 Watts	4%	8 days	43.26	100.00	0.00
BDU+BDO IV	NONE	500 Watts	4%	4 days	43.45	100.00	0.00
BDU+BDO IV	NONE	500 Watts	4%	0 days	43.69	100.00	0.00
BDU+BDO IV	NONE	500 Watts	6%	12 days	44.03	100.00	0.00
BDU+BDO IV	NONE	500 Watts	6%	8 days	44.03	100.00	0.00
BDU+BDO IV	NONE	500 Watts	6%	4 days	44.03	100.00	0.00
BDU+BDO IV	NONE	500 Watts	6%	0 days	44.03	100.00	0.00
BDU+BDO IV	NONE	600 Watts	0%	12 days	44.24	100.00	0.00
BDU+BDO IV	NONE	600 Watts	0%	8 days	44.32	100.00	0.00
BDU+BDO IV	NONE	600 Watts	0%	4 days	44.56	100.00	0.00
BDU+BDO IV	NONE	600 Watts	0%	0 days	45.37	100.00	0.00
BDU+BDO IV	NONE	600 Watts	2%	12 days	44.69	100.00	0.00
BDU+BDO IV	NONE	600 Watts	2%	8 days	44.83	100.00	0.00
BDU+BDO IV	NONE	600 Watts	2%	4 days	45.12	100.00	0.00
BDU+BDO IV	NONE	600 Watts	2%	0 days	45.72	100.00	0.00
BDU+BDO IV	NONE	600 Watts	4%	12 days	45.47	100.00	0.00
BDU+BDO IV	NONE	600 Watts	4%	8 days	45.62	100.00	0.00
BDU+BDO IV	NONE	600 Watts	4%	4 days	45.82	100.00	0.00
BDU+BDO IV	NONE	600 Watts	4%	0 days	46.07	100.00	0.00
BDU+BDO IV	NONE	600 Watts	6%	12 days	46.41	100.00	0.00
BDU+BDO IV	NONE	600 Watts	6%	8 days	46.41	100.00	0.00
BDU+BDO IV	NONE	600 Watts	6%	4 days	46.41	100.00	0.00
BDU+BDO IV	NONE	600 Watts	6%	0 days	46.41	100.00	0.00
BDU+BDO IV	FM 21-10	105 Watts	0%	12 days	37.55	.01	99.99
BDU+BDO IV	FM 21-10	105 Watts	0%	8 days	37.59	.01	99.99
BDU+BDO IV	FM 21-10	105 Watts	0%	4 days	37.70	.03	99.97
BDU+BDO IV	FM 21-10	105 Watts	0%	0 days	38.09	.32	99.68
BDU+BDO IV	FM 21-10	105 Watts	2%	12 days	37.95	.14	99.86
BDU+BDO IV	FM 21-10	105 Watts	2%	8 days	38.02	.22	99.78
BDU+BDO IV	FM 21-10	105 Watts	2%	4 days	38.15	.48	99.52
BDU+BDO IV	FM 21-10	105 Watts	2%	0 days	38.43	2.00	98.00
BDU+BDO IV	FM 21-10	105 Watts	4%	12 days	38.50	2.71	97.29
BDU+BDO IV	FM 21-10	105 Watts	4%	8 days	38.57	3.70	96.30
BDU+BDO IV	FM 21-10	105 Watts	4%	4 days	38.66	5.36	94.64
BDU+BDO IV	FM 21-10	105 Watts	4%	0 days	38.78	8.27	91.73
BDU+BDO IV	FM 21-10	105 Watts	6%	12 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-10	105 Watts	6%	8 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-10	105 Watts	6%	4 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-10	105 Watts	6%	0 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-10	150 Watts	0%	12 days	37.68	.02	32.99
BDU+BDO IV	FM 21-10	150 Watts	0%	8 days	37.71	.03	32.99
BDU+BDO IV	FM 21-10	150 Watts	0%	4 days	37.84	.07	32.98
BDU+BDO IV	FM 21-10	150 Watts	0%	0 days	38.25	.79	32.74
BDU+BDO IV	FM 21-10	150 Watts	2%	12 days	38.08	.31	32.90
BDU+BDO IV	FM 21-10	150 Watts	2%	8 days	38.15	.46	32.85
BDU+BDO IV	FM 21-10	150 Watts	2%	4 days	38.29	1.02	32.66
BDU+BDO IV	FM 21-10	150 Watts	2%	0 days	38.59	4.05	31.66
BDU+BDO IV	FM 21-10	150 Watts	4%	12 days	38.64	4.94	31.37
BDU+BDO IV	FM 21-10	150 Watts	4%	8 days	38.72	6.64	30.81
BDU+BDO IV	FM 21-10	150 Watts	4%	4 days	38.82	9.41	29.89
BDU+BDO IV	FM 21-10	150 Watts	4%	0 days	38.94	14.05	28.36
BDU+BDO IV	FM 21-10	150 Watts	6%	12 days	39.29	34.08	21.75
BDU+BDO IV	FM 21-10	150 Watts	6%	8 days	39.29	34.08	21.75
BDU+BDO IV	FM 21-10	150 Watts	6%	4 days	39.29	34.08	21.75
BDU+BDO IV	FM 21-10	150 Watts	6%	0 days	39.29	34.08	21.75

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU+BDO IV	FM 21-10	300 Watts	0%	12 days	38.32	1.14	32.62
BDU+BDO IV	FM 21-10	300 Watts	0%	8 days	38.36	1.44	32.52
BDU+BDO IV	FM 21-10	300 Watts	0%	4 days	38.52	3.03	32.00
BDU+BDO IV	FM 21-10	300 Watts	0%	0 days	39.07	20.22	26.33
BDU+BDO IV	FM 21-10	300 Watts	2%	12 days	38.73	6.91	30.72
BDU+BDO IV	FM 21-10	300 Watts	2%	8 days	38.82	9.61	29.83
BDU+BDO IV	FM 21-10	300 Watts	2%	4 days	39.01	17.48	27.23
BDU+BDO IV	FM 21-10	300 Watts	2%	0 days	39.41	43.40	18.68
BDU+BDO IV	FM 21-10	300 Watts	4%	12 days	39.36	39.45	19.98
BDU+BDO IV	FM 21-10	300 Watts	4%	8 days	39.46	47.16	17.44
BDU+BDO IV	FM 21-10	300 Watts	4%	4 days	39.59	57.14	14.14
BDU+BDO IV	FM 21-10	300 Watts	4%	0 days	39.76	69.20	10.16
BDU+BDO IV	FM 21-10	300 Watts	6%	12 days	40.11	87.88	4.00
BDU+BDO IV	FM 21-10	300 Watts	6%	8 days	40.11	87.88	4.00
BDU+BDO IV	FM 21-10	300 Watts	6%	4 days	40.11	87.88	4.00
BDU+BDO IV	FM 21-10	300 Watts	6%	0 days	40.11	87.88	4.00
BDU+BDO IV	FM 21-10	400 Watts	0%	12 days	38.82	9.41	29.89
BDU+BDO IV	FM 21-10	400 Watts	0%	8 days	38.86	11.02	29.36
BDU+BDO IV	FM 21-10	400 Watts	0%	4 days	39.04	18.74	26.82
BDU+BDO IV	FM 21-10	400 Watts	0%	0 days	39.64	60.83	12.93
BDU+BDO IV	FM 21-10	400 Watts	2%	12 days	39.23	30.08	23.07
BDU+BDO IV	FM 21-10	400 Watts	2%	8 days	39.33	37.27	20.70
BDU+BDO IV	FM 21-10	400 Watts	2%	4 days	39.54	53.38	15.38
BDU+BDO IV	FM 21-10	400 Watts	2%	0 days	39.99	82.70	5.71
BDU+BDO IV	FM 21-10	400 Watts	4%	12 days	39.89	77.41	7.45
BDU+BDO IV	FM 21-10	400 Watts	4%	8 days	40.00	83.42	5.47
BDU+BDO IV	FM 21-10	400 Watts	4%	4 days	40.15	89.45	3.48
BDU+BDO IV	FM 21-10	400 Watts	4%	0 days	40.34	94.63	1.77
BDU+BDO IV	FM 21-10	400 Watts	6%	12 days	40.68	98.86	.38
BDU+BDO IV	FM 21-10	400 Watts	6%	8 days	40.68	98.86	.38
BDU+BDO IV	FM 21-10	400 Watts	6%	4 days	40.68	98.86	.38
BDU+BDO IV	FM 21-10	400 Watts	6%	0 days	40.68	98.86	.38
BDU+BDO IV	FM 21-10	500 Watts	0%	12 days	39.34	37.58	20.60
BDU+BDO IV	FM 21-10	500 Watts	0%	8 days	39.38	41.24	19.39
BDU+BDO IV	FM 21-10	500 Watts	0%	4 days	39.55	53.90	15.21
BDU+BDO IV	FM 21-10	500 Watts	0%	0 days	40.17	90.23	3.22
BDU+BDO IV	FM 21-10	500 Watts	2%	12 days	39.75	68.56	10.38
BDU+BDO IV	FM 21-10	500 Watts	2%	8 days	39.85	74.78	8.32
BDU+BDO IV	FM 21-10	500 Watts	2%	4 days	40.06	85.77	4.70
BDU+BDO IV	FM 21-10	500 Watts	2%	0 days	40.52	97.51	.82
BDU+BDO IV	FM 21-10	500 Watts	4%	12 days	40.40	95.89	1.36
BDU+BDO IV	FM 21-10	500 Watts	4%	8 days	40.52	97.53	.82
BDU+BDO IV	FM 21-10	500 Watts	4%	4 days	40.67	98.80	.40
BDU+BDO IV	FM 21-10	500 Watts	4%	0 days	40.87	99.57	.14
BDU+BDO IV	FM 21-10	500 Watts	6%	12 days	41.21	99.95	.02
BDU+BDO IV	FM 21-10	500 Watts	6%	8 days	41.21	99.95	.02
BDU+BDO IV	FM 21-10	500 Watts	6%	4 days	41.21	99.95	.02
BDU+BDO IV	FM 21-10	500 Watts	6%	0 days	41.21	99.95	.02
BDU+BDO IV	FM 21-10	600 Watts	0%	12 days	39.88	76.78	7.66
BDU+BDO IV	FM 21-10	600 Watts	0%	8 days	39.93	79.54	6.75
BDU+BDO IV	FM 21-10	600 Watts	0%	4 days	40.09	87.25	4.21
BDU+BDO IV	FM 21-10	600 Watts	0%	0 days	40.67	98.79	.40
BDU+BDO IV	FM 21-10	600 Watts	2%	12 days	40.29	93.69	2.08
BDU+BDO IV	FM 21-10	600 Watts	2%	8 days	40.39	95.64	1.44
BDU+BDO IV	FM 21-10	600 Watts	2%	4 days	40.58	98.15	.61
BDU+BDO IV	FM 21-10	600 Watts	2%	0 days	41.02	99.83	.06
BDU+BDO IV	FM 21-10	600 Watts	4%	12 days	40.93	99.70	.10
BDU+BDO IV	FM 21-10	600 Watts	4%	8 days	41.04	99.84	.05
BDU+BDO IV	FM 21-10	600 Watts	4%	4 days	41.18	99.94	.02
BDU+BDO IV	FM 21-10	600 Watts	4%	0 days	41.37	99.98	.01
BDU+BDO IV	FM 21-10	600 Watts	6%	12 days	41.71	100.00	0.00
BDU+BDO IV	FM 21-10	600 Watts	6%	8 days	41.71	100.00	0.00
BDU+BDO IV	FM 21-10	600 Watts	6%	4 days	41.71	100.00	0.00
BDU+BDO IV	FM 21-10	600 Watts	6%	0 days	41.71	100.00	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU+BDO IV	MET LIMIT 39oC	105 Watts	0%	12 days	37.55	.01	99.99
BDU+BDO IV	MET LIMIT 39oC	105 Watts	0%	8 days	37.59	.01	99.99
BDU+BDO IV	MET LIMIT 39oC	105 Watts	0%	4 days	37.70	.03	99.97
BDU+BDO IV	MET LIMIT 39oC	105 Watts	0%	0 days	38.09	.32	99.68
BDU+BDO IV	MET LIMIT 39oC	105 Watts	2%	12 days	37.95	.14	99.86
BDU+BDO IV	MET LIMIT 39oC	105 Watts	2%	8 days	38.02	.22	99.78
BDU+BDO IV	MET LIMIT 39oC	105 Watts	2%	4 days	38.15	.48	99.52
BDU+BDO IV	MET LIMIT 39oC	105 Watts	2%	0 days	38.43	2.00	98.00
BDU+BDO IV	MET LIMIT 39oC	105 Watts	4%	12 days	38.50	2.71	97.29
BDU+BDO IV	MET LIMIT 39oC	105 Watts	4%	8 days	38.57	3.70	96.30
BDU+BDO IV	MET LIMIT 39oC	105 Watts	4%	4 days	38.66	5.36	94.64
BDU+BDO IV	MET LIMIT 39oC	105 Watts	4%	0 days	38.78	8.27	91.73
BDU+BDO IV	MET LIMIT 39oC	105 Watts	6%	12 days	39.13	23.60	76.40
BDU+BDO IV	MET LIMIT 39oC	105 Watts	6%	8 days	39.13	23.60	76.40
BDU+BDO IV	MET LIMIT 39oC	105 Watts	6%	4 days	39.13	23.60	76.40
BDU+BDO IV	MET LIMIT 39oC	105 Watts	6%	0 days	39.13	23.60	76.40
BDU+BDO IV	MET LIMIT 39oC	150 Watts	0%	12 days	37.86	.08	99.92
BDU+BDO IV	MET LIMIT 39oC	150 Watts	0%	8 days	37.90	.10	99.90
BDU+BDO IV	MET LIMIT 39oC	150 Watts	0%	4 days	38.03	.24	99.76
BDU+BDO IV	MET LIMIT 39oC	150 Watts	0%	0 days	38.47	2.42	97.58
BDU+BDO IV	MET LIMIT 39oC	150 Watts	2%	12 days	38.26	.87	99.13
BDU+BDO IV	MET LIMIT 39oC	150 Watts	2%	8 days	38.34	1.28	98.72
BDU+BDO IV	MET LIMIT 39oC	150 Watts	2%	4 days	38.50	2.69	97.31
BDU+BDO IV	MET LIMIT 39oC	150 Watts	2%	0 days	38.82	9.58	90.42
BDU+BDO IV	MET LIMIT 39oC	150 Watts	4%	12 days	38.84	10.36	89.64
BDU+BDO IV	MET LIMIT 39oC	150 Watts	4%	8 days	38.93	13.54	86.46
BDU+BDO IV	MET LIMIT 39oC	150 Watts	4%	4 days	39.00	16.87	82.30
BDU+BDO IV	MET LIMIT 39oC	150 Watts	4%	0 days	39.00	16.93	72.27
BDU+BDO IV	MET LIMIT 39oC	150 Watts	6%	12 days	39.09	21.24	8.19
BDU+BDO IV	MET LIMIT 39oC	150 Watts	6%	8 days	39.09	21.24	8.19
BDU+BDO IV	MET LIMIT 39oC	150 Watts	6%	4 days	39.09	21.24	8.19
BDU+BDO IV	MET LIMIT 39oC	150 Watts	6%	0 days	39.09	21.24	8.19
BDU+BDO IV	MET LIMIT 39oC	300 Watts	0%	12 days	39.00	16.88	81.46
BDU+BDO IV	MET LIMIT 39oC	300 Watts	0%	8 days	39.02	17.74	78.97
BDU+BDO IV	MET LIMIT 39oC	300 Watts	0%	4 days	39.04	18.68	71.56
BDU+BDO IV	MET LIMIT 39oC	300 Watts	0%	0 days	39.04	18.74	49.57
BDU+BDO IV	MET LIMIT 39oC	300 Watts	2%	12 days	39.04	18.64	61.83
BDU+BDO IV	MET LIMIT 39oC	300 Watts	2%	8 days	39.01	17.11	56.37
BDU+BDO IV	MET LIMIT 39oC	300 Watts	2%	4 days	39.04	18.88	49.48
BDU+BDO IV	MET LIMIT 39oC	300 Watts	2%	0 days	39.04	18.92	34.05
BDU+BDO IV	MET LIMIT 39oC	300 Watts	4%	12 days	39.04	18.88	32.45
BDU+BDO IV	MET LIMIT 39oC	300 Watts	4%	8 days	39.04	18.93	28.37
BDU+BDO IV	MET LIMIT 39oC	300 Watts	4%	4 days	39.04	19.02	23.48
BDU+BDO IV	MET LIMIT 39oC	300 Watts	4%	0 days	39.04	18.65	17.90
BDU+BDO IV	MET LIMIT 39oC	300 Watts	6%	12 days	39.09	21.24	1.89
BDU+BDO IV	MET LIMIT 39oC	300 Watts	6%	8 days	39.09	21.24	1.89
BDU+BDO IV	MET LIMIT 39oC	300 Watts	6%	4 days	39.09	21.24	1.89
BDU+BDO IV	MET LIMIT 39oC	300 Watts	6%	0 days	39.09	21.24	1.89
BDU+BDO IV	MET LIMIT 39oC	400 Watts	0%	12 days	39.09	21.24	51.19
BDU+BDO IV	MET LIMIT 39oC	400 Watts	0%	8 days	39.04	18.74	52.01
BDU+BDO IV	MET LIMIT 39oC	400 Watts	0%	4 days	39.04	18.68	47.17
BDU+BDO IV	MET LIMIT 39oC	400 Watts	0%	0 days	39.04	18.74	32.50
BDU+BDO IV	MET LIMIT 39oC	400 Watts	2%	12 days	39.04	18.87	40.57
BDU+BDO IV	MET LIMIT 39oC	400 Watts	2%	8 days	39.01	17.11	37.30
BDU+BDO IV	MET LIMIT 39oC	400 Watts	2%	4 days	39.04	18.88	32.45
BDU+BDO IV	MET LIMIT 39oC	400 Watts	2%	0 days	39.04	18.92	22.70
BDU+BDO IV	MET LIMIT 39oC	400 Watts	4%	12 days	39.04	18.64	21.15
BDU+BDO IV	MET LIMIT 39oC	400 Watts	4%	8 days	39.04	18.93	18.65
BDU+BDO IV	MET LIMIT 39oC	400 Watts	4%	4 days	39.04	19.02	15.39
BDU+BDO IV	MET LIMIT 39oC	400 Watts	4%	0 days	39.04	18.65	11.39
BDU+BDO IV	MET LIMIT 39oC	400 Watts	6%	12 days	39.09	21.24	1.26
BDU+BDO IV	MET LIMIT 39oC	400 Watts	6%	8 days	39.09	21.24	1.26
BDU+BDO IV	MET LIMIT 39oC	400 Watts	6%	4 days	39.09	21.24	1.26
BDU+BDO IV	MET LIMIT 39oC	400 Watts	6%	0 days	39.09	21.24	1.26

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU+BDO IV	MET LIMIT 39oC	500 Watts	0%	12 days	39.04	18.87	38.94
BDU+BDO IV	MET LIMIT 39oC	500 Watts	0%	8 days	39.04	18.74	39.00
BDU+BDO IV	MET LIMIT 39oC	500 Watts	0%	4 days	39.04	18.68	34.97
BDU+BDO IV	MET LIMIT 39oC	500 Watts	0%	0 days	39.04	18.74	24.38
BDU+BDO IV	MET LIMIT 39oC	500 Watts	2%	12 days	39.04	18.64	30.10
BDU+BDO IV	MET LIMIT 39oC	500 Watts	2%	8 days	39.01	17.11	27.35
BDU+BDO IV	MET LIMIT 39oC	500 Watts	2%	4 days	39.04	18.88	24.34
BDU+BDO IV	MET LIMIT 39oC	500 Watts	2%	0 days	39.04	18.92	17.03
BDU+BDO IV	MET LIMIT 39oC	500 Watts	4%	12 days	39.04	18.88	16.22
BDU+BDO IV	MET LIMIT 39oC	500 Watts	4%	8 days	39.04	18.93	13.78
BDU+BDO IV	MET LIMIT 39oC	500 Watts	4%	4 days	39.04	19.02	11.34
BDU+BDO IV	MET LIMIT 39oC	500 Watts	4%	0 days	39.04	18.65	8.95
BDU+BDO IV	MET LIMIT 39oC	500 Watts	6%	12 days	39.09	21.24	.95
BDU+BDO IV	MET LIMIT 39oC	500 Watts	6%	8 days	39.09	21.24	.95
BDU+BDO IV	MET LIMIT 39oC	500 Watts	6%	4 days	39.09	21.24	.95
BDU+BDO IV	MET LIMIT 39oC	500 Watts	6%	0 days	39.09	21.24	.95
BDU+BDO IV	MET LIMIT 39oC	600 Watts	0%	12 days	39.04	18.87	31.64
BDU+BDO IV	MET LIMIT 39oC	600 Watts	0%	8 days	39.04	18.74	30.07
BDU+BDO IV	MET LIMIT 39oC	600 Watts	0%	4 days	39.04	18.68	27.65
BDU+BDO IV	MET LIMIT 39oC	600 Watts	0%	0 days	39.04	18.74	21.94
BDU+BDO IV	MET LIMIT 39oC	600 Watts	2%	12 days	39.04	18.64	24.41
BDU+BDO IV	MET LIMIT 39oC	600 Watts	2%	8 days	39.04	18.88	21.09
BDU+BDO IV	MET LIMIT 39oC	600 Watts	2%	4 days	39.04	18.88	19.47
BDU+BDO IV	MET LIMIT 39oC	600 Watts	2%	0 days	39.04	18.92	13.78
BDU+BDO IV	MET LIMIT 39oC	600 Watts	4%	12 days	39.04	18.88	12.98
BDU+BDO IV	MET LIMIT 39oC	600 Watts	4%	8 days	39.04	18.93	11.35
BDU+BDO IV	MET LIMIT 39oC	600 Watts	4%	4 days	39.04	19.02	8.91
BDU+BDO IV	MET LIMIT 39oC	600 Watts	4%	0 days	39.04	18.65	7.32
BDU+BDO IV	MET LIMIT 39oC	600 Watts	6%	12 days	39.09	21.24	.71
BDU+BDO IV	MET LIMIT 39oC	600 Watts	6%	8 days	39.09	21.24	.71
BDU+BDO IV	MET LIMIT 39oC	600 Watts	6%	4 days	39.09	21.24	.71
BDU+BDO IV	MET LIMIT 39oC	600 Watts	6%	0 days	39.09	21.24	.71
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	0%	12 days	37.55	.01	99.99
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	0%	8 days	37.59	.01	99.99
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	0%	4 days	37.70	.03	99.97
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	0%	0 days	38.09	.32	99.68
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	2%	12 days	37.95	.14	99.86
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	2%	8 days	38.02	.22	99.78
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	2%	4 days	38.15	.48	99.52
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	2%	0 days	38.43	2.00	98.00
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	4%	12 days	38.50	2.71	97.29
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	4%	8 days	38.57	3.70	96.30
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	4%	4 days	38.66	5.36	94.64
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	4%	0 days	38.78	8.27	91.73
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	6%	12 days	39.13	23.60	76.40
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	6%	8 days	39.13	23.60	76.40
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	6%	4 days	39.13	23.60	76.40
BDU+BDO IV	MET LIMIT 38.5oC	105 Watts	6%	0 days	39.13	23.60	76.40
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	0%	12 days	37.86	.08	99.92
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	0%	8 days	37.90	.10	99.90
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	0%	4 days	38.03	.24	99.76
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	0%	0 days	38.47	2.42	97.58
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	2%	12 days	38.26	.87	99.13
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	2%	8 days	38.34	1.28	98.72
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	2%	4 days	38.50	2.69	97.31
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	2%	0 days	38.53	3.10	51.36
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	4%	12 days	38.53	3.11	29.07
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	4%	8 days	38.53	3.13	14.53
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	4%	4 days	38.62	4.58	4.20
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	4%	0 days	39.12	23.34	0.00
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	6%	12 days	39.47	47.60	0.00
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	6%	8 days	39.47	47.60	0.00
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	6%	4 days	39.47	47.60	0.00
BDU+BDO IV	MET LIMIT 38.5oC	150 Watts	6%	0 days	39.47	47.60	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	0%	12 days	38.53	3.08	69.78
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	0%	8 days	38.53	3.09	65.90
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	0%	4 days	38.53	3.08	57.18
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	0%	0 days	38.54	3.18	31.95
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	2%	12 days	38.53	3.10	42.64
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	2%	8 days	38.53	3.10	38.76
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	2%	4 days	38.53	3.07	29.08
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	2%	0 days	38.53	3.10	11.63
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	4%	12 days	38.53	3.11	6.78
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	4%	8 days	38.53	3.13	3.29
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	4%	4 days	38.62	4.58	.95
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	4%	0 days	38.74	7.14	0.00
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	6%	12 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	6%	8 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	6%	4 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	300 Watts	6%	0 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	0%	12 days	38.53	3.08	45.55
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	0%	8 days	38.53	3.09	43.61
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	0%	4 days	38.53	3.08	37.80
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	0%	0 days	38.54	3.18	21.30
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	2%	12 days	38.53	3.10	28.10
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	2%	8 days	38.53	3.10	25.19
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	2%	4 days	38.53	3.07	19.39
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	2%	0 days	38.53	3.10	7.75
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	4%	12 days	38.53	3.11	4.36
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	4%	8 days	38.53	3.13	0.00
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	4%	4 days	38.62	4.58	.67
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	4%	0 days	38.74	7.14	0.00
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	6%	12 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	6%	8 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	6%	4 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	400 Watts	6%	0 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	0%	12 days	38.53	3.08	34.89
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	0%	8 days	38.53	3.09	32.95
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	0%	4 days	38.53	3.08	28.11
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	0%	0 days	38.54	3.18	15.49
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	2%	12 days	38.53	3.10	21.32
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	2%	8 days	38.53	3.10	19.38
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	2%	4 days	38.53	3.07	14.54
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	2%	0 days	38.53	3.10	5.81
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	4%	12 days	38.53	3.11	3.29
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	4%	8 days	38.53	3.13	1.65
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	4%	4 days	38.62	4.58	.48
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	4%	0 days	38.74	7.14	0.00
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	6%	12 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	6%	8 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	6%	4 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	500 Watts	6%	0 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	0%	12 days	38.53	3.08	28.11
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	0%	8 days	38.53	3.09	26.17
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	0%	4 days	38.53	3.08	22.29
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	0%	0 days	38.54	3.18	12.59
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	2%	12 days	38.53	3.10	17.44
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	2%	8 days	38.53	3.10	15.50
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	2%	4 days	38.53	3.07	11.63
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	2%	0 days	38.53	3.10	4.65
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	4%	12 days	38.53	3.11	2.62
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	4%	8 days	38.53	3.13	1.26
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	4%	4 days	38.62	4.58	.38
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	4%	0 days	38.74	7.14	0.00
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	6%	12 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	6%	8 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	6%	4 days	39.09	21.24	0.00
BDU+BDO IV	MET LIMIT 38.5oC	600 Watts	6%	0 days	39.09	21.24	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU+BDO IV	MET LIMIT 38oC	105 Watts	0%	12 days	37.55	.01	99.99
BDU+BDO IV	MET LIMIT 38oC	105 Watts	0%	8 days	37.59	.01	99.99
BDU+BDO IV	MET LIMIT 38oC	105 Watts	0%	4 days	37.70	.03	99.97
BDU+BDO IV	MET LIMIT 38oC	105 Watts	0%	0 days	38.09	.32	99.68
BDU+BDO IV	MET LIMIT 38oC	105 Watts	2%	12 days	37.95	.14	99.86
BDU+BDO IV	MET LIMIT 38oC	105 Watts	2%	8 days	38.02	.22	99.78
BDU+BDO IV	MET LIMIT 38oC	105 Watts	2%	4 days	38.15	.48	99.52
BDU+BDO IV	MET LIMIT 38oC	105 Watts	2%	0 days	38.43	2.00	98.00
BDU+BDO IV	MET LIMIT 38oC	105 Watts	4%	12 days	38.50	2.71	97.29
BDU+BDO IV	MET LIMIT 38oC	105 Watts	4%	8 days	38.57	3.70	96.30
BDU+BDO IV	MET LIMIT 38oC	105 Watts	4%	4 days	38.66	5.36	94.64
BDU+BDO IV	MET LIMIT 38oC	105 Watts	4%	0 days	38.78	8.27	91.73
BDU+BDO IV	MET LIMIT 38oC	105 Watts	6%	12 days	39.13	23.60	76.40
BDU+BDO IV	MET LIMIT 38oC	105 Watts	6%	8 days	39.13	23.60	76.40
BDU+BDO IV	MET LIMIT 38oC	105 Watts	6%	4 days	39.13	23.60	76.40
BDU+BDO IV	MET LIMIT 38oC	105 Watts	6%	0 days	39.13	23.60	76.40
BDU+BDO IV	MET LIMIT 38oC	150 Watts	0%	12 days	37.86	.08	99.92
BDU+BDO IV	MET LIMIT 38oC	150 Watts	0%	8 days	37.90	.10	99.90
BDU+BDO IV	MET LIMIT 38oC	150 Watts	0%	4 days	38.00	.20	98.80
BDU+BDO IV	MET LIMIT 38oC	150 Watts	0%	0 days	38.04	.25	18.95
BDU+BDO IV	MET LIMIT 38oC	150 Watts	2%	12 days	38.02	.22	39.91
BDU+BDO IV	MET LIMIT 38oC	150 Watts	2%	8 days	38.02	.22	0.00
BDU+BDO IV	MET LIMIT 38oC	150 Watts	2%	4 days	38.15	.48	0.00
BDU+BDO IV	MET LIMIT 38oC	150 Watts	2%	0 days	38.43	2.00	0.00
BDU+BDO IV	MET LIMIT 38oC	150 Watts	4%	12 days	38.50	2.71	0.00
BDU+BDO IV	MET LIMIT 38oC	150 Watts	4%	8 days	38.57	3.70	0.00
BDU+BDO IV	MET LIMIT 38oC	150 Watts	4%	4 days	38.66	5.36	0.00
BDU+BDO IV	MET LIMIT 38oC	150 Watts	4%	0 days	38.78	8.27	0.00
BDU+BDO IV	MET LIMIT 38oC	150 Watts	6%	12 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	150 Watts	6%	8 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	150 Watts	6%	4 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	150 Watts	6%	0 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	300 Watts	0%	12 days	38.02	.22	37.92
BCU+BDO IV	MET LIMIT 38oC	300 Watts	0%	8 days	38.02	.23	35.92
BDU+BDO IV	MET LIMIT 38oC	300 Watts	0%	4 days	38.04	.22	26.94
BDU+BDO IV	MET LIMIT 38oC	300 Watts	0%	0 days	38.04	.25	4.29
BDU+BDO IV	MET LIMIT 38oC	300 Watts	2%	12 days	38.02	.22	8.98
BDU+BDO IV	MET LIMIT 38oC	300 Watts	2%	8 days	38.02	.22	0.00
BDU+BDO IV	MET LIMIT 38oC	300 Watts	2%	4 days	38.15	.48	0.00
BDU+BDO IV	MET LIMIT 38oC	300 Watts	2%	0 days	38.43	2.00	0.00
BDU+BDO IV	MET LIMIT 38oC	300 Watts	4%	12 days	38.50	2.71	0.00
BDU+BDO IV	MET LIMIT 38oC	300 Watts	4%	8 days	38.57	3.70	0.00
BDU+BDO IV	MET LIMIT 38oC	300 Watts	4%	4 days	38.66	5.36	0.00
BDU+BDO IV	MET LIMIT 38oC	300 Watts	4%	0 days	38.78	8.27	0.00
BDU+BDO IV	MET LIMIT 38oC	300 Watts	6%	12 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	300 Watts	6%	8 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	300 Watts	6%	4 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	300 Watts	6%	0 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	400 Watts	0%	12 days	38.02	.22	24.95
BDU+BDO IV	MET LIMIT 38oC	400 Watts	0%	8 days	38.02	.23	23.94
BDU+BDO IV	MET LIMIT 38oC	400 Watts	0%	4 days	38.02	.22	17.96
BDU+BDO IV	MET LIMIT 38oC	400 Watts	0%	0 days	38.04	.25	2.79
BDU+BDO IV	MET LIMIT 38oC	400 Watts	2%	12 days	38.02	.22	6.09
BDU+BDO IV	MET LIMIT 38oC	400 Watts	2%	8 days	38.02	.22	0.00
BDU+BDO IV	MET LIMIT 38oC	400 Watts	2%	4 days	38.15	.48	0.00
BDU+BDO IV	MET LIMIT 38oC	400 Watts	2%	0 days	38.43	2.00	0.00
BDU+BDO IV	MET LIMIT 38oC	400 Watts	4%	12 days	38.50	2.71	0.00
BDU+BDO IV	MET LIMIT 38oC	400 Watts	4%	8 days	38.57	3.70	0.00
BDU+BDO IV	MET LIMIT 38oC	400 Watts	4%	4 days	38.66	5.36	0.00
BDU+BDO IV	MET LIMIT 38oC	400 Watts	4%	0 days	38.78	8.27	0.00
BDU+BDO IV	MET LIMIT 38oC	400 Watts	6%	12 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	400 Watts	6%	8 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	400 Watts	6%	4 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	400 Watts	6%	0 days	39.13	23.60	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU+BDO IV	MET LIMIT 38oC	500 Watts	0%	12 days	38.02	.22	18.96
BDU+BDO IV	MET LIMIT 38oC	500 Watts	0%	8 days	38.02	.23	17.96
BDU+BDO IV	MET LIMIT 38oC	500 Watts	0%	4 days	38.02	.22	12.97
BDU+BDO IV	MET LIMIT 38oC	500 Watts	0%	0 days	38.04	.25	2.09
BDU+BDO IV	MET LIMIT 38oC	500 Watts	2%	12 days	38.02	.22	4.59
BDU+BDO IV	MET LIMIT 38oC	500 Watts	2%	8 days	38.02	.22	0.00
BDU+BDO IV	MET LIMIT 38oC	500 Watts	2%	4 days	38.02	.22	0.00
BDU+BDO IV	MET LIMIT 38oC	500 Watts	2%	0 days	38.43	2.00	0.00
BDU+BDO IV	MET LIMIT 38oC	500 Watts	4%	12 days	38.50	2.71	0.00
BDU+BDO IV	MET LIMIT 38oC	500 Watts	4%	8 days	38.57	3.70	0.00
BDU+BDO IV	MET LIMIT 38oC	500 Watts	4%	4 days	38.66	5.26	0.00
BDU+BDO IV	MET LIMIT 38oC	500 Watts	4%	0 days	38.78	8.27	0.00
BDU+BDO IV	MET LIMIT 38oC	500 Watts	6%	12 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	500 Watts	6%	8 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	500 Watts	6%	4 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	500 Watts	6%	0 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	600 Watts	0%	12 days	38.02	.22	14.97
BDU+BDO IV	MET LIMIT 38oC	600 Watts	0%	8 days	38.02	.23	13.97
BDU+BDO IV	MET LIMIT 38oC	600 Watts	0%	4 days	38.02	.22	10.98
BDU+BDO IV	MET LIMIT 38oC	600 Watts	0%	0 days	38.04	.25	1.70
BDU+BDO IV	MET LIMIT 38oC	600 Watts	2%	12 days	38.02	.22	3.59
BDU+BDO IV	MET LIMIT 38oC	600 Watts	2%	8 days	38.02	.22	0.00
BDU+BDO IV	MET LIMIT 38oC	600 Watts	2%	4 days	38.15	.48	0.00
BDU+BDO IV	MET LIMIT 38oC	600 Watts	2%	0 days	38.43	2.00	0.00
BDU+BDO IV	MET LIMIT 38oC	600 Watts	4%	12 days	38.50	2.71	0.00
BDU+BDO IV	MET LIMIT 38oC	600 Watts	4%	8 days	38.57	3.70	0.00
BDU+BDO IV	MET LIMIT 38oC	600 Watts	4%	4 days	38.66	5.36	0.00
BDU+BDO IV	MET LIMIT 38oC	600 Watts	4%	0 days	38.78	8.27	0.00
BDU+BDO IV	MET LIMIT 38oC	600 Watts	6%	12 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	600 Watts	6%	8 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	600 Watts	6%	4 days	39.13	23.60	0.00
BDU+BDO IV	MET LIMIT 38oC	600 Watts	6%	0 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	105 Watts	0%	12 days	37.55	.01	99.99
BDU+BDO IV	FM 21-40	105 Watts	0%	8 days	37.59	.01	99.99
BDU+BDO IV	FM 21-40	105 Watts	0%	4 days	37.70	.03	99.97
BDU+BDO IV	FM 21-40	105 Watts	0%	0 days	38.09	.32	99.68
BDU+BDO IV	FM 21-40	105 Watts	2%	12 days	37.95	.14	99.86
BDU+BDO IV	FM 21-40	105 Watts	2%	8 days	38.02	.22	99.78
BDU+BDO IV	FM 21-40	105 Watts	2%	4 days	38.15	.48	99.52
BDU+BDO IV	FM 21-40	105 Watts	2%	0 days	38.43	2.00	98.00
BDU+BDO IV	FM 21-40	105 Watts	4%	12 days	38.50	2.71	97.29
BDU+BDO IV	FM 21-40	105 Watts	4%	8 days	38.57	3.70	96.30
BDU+BDO IV	FM 21-40	105 Watts	4%	4 days	38.66	5.36	94.64
BDU+BDO IV	FM 21-40	105 Watts	4%	0 days	38.78	8.27	91.73
BDU+BDO IV	FM 21-40	105 Watts	6%	12 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-40	105 Watts	6%	8 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-40	105 Watts	6%	4 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-40	105 Watts	6%	0 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-40	150 Watts	0%	12 days	37.67	.02	28.99
BDU+BDO IV	FM 21-40	150 Watts	0%	8 days	37.71	.03	28.99
BDU+BDO IV	FM 21-40	150 Watts	0%	4 days	37.83	.07	28.98
BDU+BDO IV	FM 21-40	150 Watts	0%	0 days	38.24	.76	28.78
BDU+BDO IV	FM 21-40	150 Watts	2%	12 days	38.07	.30	28.91
BDU+BDO IV	FM 21-40	150 Watts	2%	8 days	38.14	.45	28.87
BDU+BDO IV	FM 21-40	150 Watts	2%	4 days	38.29	.98	28.72
BDU+BDO IV	FM 21-40	150 Watts	2%	0 days	38.58	3.91	27.87
BDU+BDO IV	FM 21-40	150 Watts	4%	12 days	38.63	4.79	27.61
BDU+BDO IV	FM 21-40	150 Watts	4%	8 days	38.71	6.45	27.13
BDU+BDO IV	FM 21-40	150 Watts	4%	4 days	38.81	9.16	26.34
BDU+BDO IV	FM 21-40	150 Watts	4%	0 days	38.93	13.70	25.03
BDU+BDO IV	FM 21-40	150 Watts	6%	12 days	39.28	33.49	19.29
BDU+BDO IV	FM 21-40	150 Watts	6%	8 days	39.28	33.49	19.29
BDU+BDO IV	FM 21-40	150 Watts	6%	4 days	39.28	33.49	19.29
BDU+BDO IV	FM 21-40	150 Watts	6%	0 days	39.28	33.49	19.29

131

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU+BDO IV	FM 21-40	300 Watts	0%	12 days	37.55	.01	0.00
BDU+BDO IV	FM 21-40	300 Watts	0%	8 days	37.59	.01	0.00
BDU+BDO IV	FM 21-40	300 Watts	0%	4 days	37.70	.03	0.00
BDU+BDO IV	FM 21-40	300 Watts	0%	0 days	38.09	.32	0.00
BDU+BDO IV	FM 21-40	300 Watts	2%	12 days	37.95	.14	0.00
BDU+BDO IV	FM 21-40	300 Watts	2%	8 days	38.02	.22	0.00
BDU+BDO IV	FM 21-40	300 Watts	2%	4 days	38.15	.48	0.00
BDU+BDO IV	FM 21-40	300 Watts	2%	0 days	38.43	2.00	0.00
BDU+BDO IV	FM 21-40	300 Watts	4%	12 days	38.50	2.71	0.00
BDU+BDO IV	FM 21-40	300 Watts	4%	8 days	38.57	3.70	0.00
BDU+BDO IV	FM 21-40	300 Watts	4%	4 days	38.66	5.36	0.00
BDU+BDO IV	FM 21-40	300 Watts	4%	0 days	38.78	8.27	0.00
BDU+BDO IV	FM 21-40	300 Watts	6%	12 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	300 Watts	6%	8 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	300 Watts	6%	4 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	300 Watts	6%	0 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	400 Watts	0%	12 days	37.55	.01	0.00
BDU+BDO IV	FM 21-40	400 Watts	0%	8 days	37.59	.01	0.00
BDU+BDO IV	FM 21-40	400 Watts	0%	4 days	37.70	.03	0.00
BDU+BDO IV	FM 21-40	400 Watts	0%	0 days	38.09	.32	0.00
BDU+BDO IV	FM 21-40	400 Watts	2%	12 days	37.95	.14	0.00
BDU+BDO IV	FM 21-40	400 Watts	2%	8 days	38.02	.22	0.00
BDU+BDO IV	FM 21-40	400 Watts	2%	4 days	38.15	.48	0.00
BDU+BDO IV	FM 21-40	400 Watts	2%	0 days	38.43	2.00	0.00
BDU+BDO IV	FM 21-40	400 Watts	4%	12 days	38.50	2.71	0.00
BDU+BDO IV	FM 21-40	400 Watts	4%	8 days	38.57	3.70	0.00
BDU+BDO IV	FM 21-40	400 Watts	4%	4 days	38.66	5.36	0.00
BDU+BDO IV	FM 21-40	400 Watts	4%	0 days	38.78	8.27	0.00
BDU+BDO IV	FM 21-40	400 Watts	6%	12 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	400 Watts	6%	8 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	400 Watts	6%	4 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	400 Watts	6%	0 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	500 Watts	0%	12 days	37.55	.01	0.00
BDU+BDO IV	FM 21-40	500 Watts	0%	8 days	37.59	.01	0.00
BDU+BDO IV	FM 21-40	500 Watts	0%	4 days	37.70	.03	0.00
BDU+BDO IV	FM 21-40	500 Watts	0%	0 days	38.09	.32	0.00
BDU+BDO IV	FM 21-40	500 Watts	2%	12 days	37.95	.14	0.00
BDU+BDO IV	FM 21-40	500 Watts	2%	8 days	38.02	.22	0.00
BDU+BDO IV	FM 21-40	500 Watts	2%	4 days	38.15	.48	0.00
BDU+BDO IV	FM 21-40	500 Watts	2%	0 days	38.43	2.00	0.00
BDU+BDO IV	FM 21-40	500 Watts	4%	12 days	38.50	2.71	0.00
BDU+BDO IV	FM 21-40	500 Watts	4%	8 days	38.57	3.70	0.00
BDU+BDO IV	FM 21-40	500 Watts	4%	4 days	38.66	5.36	0.00
BDU+BDO IV	FM 21-40	500 Watts	4%	0 days	38.78	8.27	0.00
BDU+BDO IV	FM 21-40	500 Watts	6%	12 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	500 Watts	6%	8 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	500 Watts	6%	4 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	500 Watts	6%	0 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	600 Watts	0%	12 days	37.55	.01	0.00
BDU+BDO IV	FM 21-40	600 Watts	0%	8 days	37.59	.01	0.00
BDU+BDO IV	FM 21-40	600 Watts	0%	4 days	37.70	.03	0.00
BDU+BDO IV	FM 21-40	600 Watts	0%	0 days	38.09	.32	0.00
BDU+BDO IV	FM 21-40	600 Watts	2%	12 days	37.95	.14	0.00
BDU+BDO IV	FM 21-40	600 Watts	2%	8 days	38.02	.22	0.00
BDU+BDO IV	FM 21-40	600 Watts	2%	4 days	38.15	.48	0.00
BDU+BDO IV	FM 21-40	600 Watts	2%	0 days	38.43	2.00	0.00
BDU+BDO IV	FM 21-40	600 Watts	4%	12 days	38.50	2.71	0.00
BDU+BDO IV	FM 21-40	600 Watts	4%	8 days	38.57	3.70	0.00
BDU+BDO IV	FM 21-40	600 Watts	4%	4 days	38.66	5.36	0.00
BDU+BDO IV	FM 21-40	600 Watts	4%	0 days	38.78	8.27	0.00
BDU+BDO IV	FM 21-40	600 Watts	6%	12 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	600 Watts	6%	8 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	600 Watts	6%	4 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40	600 Watts	6%	0 days	39.13	23.60	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	0%	12 days	37.55	.01	99.99
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	0%	8 days	37.59	.01	99.99
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	0%	4 days	37.70	.03	99.97
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	0%	0 days	38.09	.32	99.68
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	2%	12 days	37.95	.14	99.86
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	2%	8 days	38.02	.22	99.78
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	2%	4 days	38.15	.48	99.52
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	2%	0 days	38.43	2.00	98.00
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	4%	12 days	38.50	2.71	97.29
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	4%	8 days	38.57	3.70	96.30
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	4%	4 days	38.66	5.36	94.64
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	4%	0 days	38.78	8.27	91.73
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	6%	12 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	6%	8 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	6%	4 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-10 VARIANT	105 Watts	6%	0 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	0%	12 days	37.69	.02	46.99
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	0%	8 days	37.72	.03	46.99
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	0%	4 days	37.84	.07	46.97
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	0%	0 days	38.25	.79	46.63
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	2%	12 days	38.08	.31	46.85
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	2%	8 days	38.15	.46	46.78
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	2%	4 days	38.29	1.02	46.52
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	2%	0 days	38.59	4.05	45.10
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	4%	12 days	38.64	4.94	44.68
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	4%	8 days	38.72	6.64	43.88
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	4%	4 days	38.82	9.41	42.58
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	4%	0 days	38.94	14.06	40.39
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	6%	12 days	39.29	34.08	30.98
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	6%	8 days	39.29	34.08	30.98
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	6%	4 days	39.29	34.08	30.98
BDU+BDO IV	FM 21-10 VARIANT	150 Watts	6%	0 days	39.29	34.08	30.98
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	0%	12 days	38.76	7.81	43.33
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	0%	8 days	38.81	9.18	42.69
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	0%	4 days	38.96	15.01	39.95
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	0%	0 days	39.46	47.14	24.84
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	2%	12 days	39.17	26.50	34.55
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	2%	8 days	39.26	32.33	31.80
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	2%	4 days	39.44	45.68	25.53
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	2%	0 days	39.81	72.44	12.95
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	4%	12 days	39.79	71.19	13.54
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	4%	8 days	39.89	77.17	10.73
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	4%	4 days	40.01	83.64	7.69
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	4%	0 days	40.16	89.68	4.85
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	6%	12 days	40.50	97.33	1.25
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	6%	8 days	40.50	97.33	1.25
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	6%	4 days	40.50	97.33	1.25
BDU+BDO IV	FM 21-10 VARIANT	300 Watts	6%	0 days	40.50	97.33	1.25
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	0%	12 days	39.73	67.01	15.51
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	0%	8 days	39.78	70.73	13.76
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	0%	4 days	39.97	81.52	8.69
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	0%	0 days	40.58	98.11	.89
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	2%	12 days	40.15	89.51	4.93
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	2%	8 days	40.26	92.75	3.41
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	2%	4 days	40.48	96.97	1.42
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	2%	0 days	40.93	99.70	.14
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	4%	12 days	40.82	99.45	.26
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	4%	8 days	40.94	99.72	.13
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	4%	4 days	41.09	99.89	.05
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	4%	0 days	41.27	99.97	.01
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	6%	12 days	41.62	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	6%	8 days	41.62	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	6%	4 days	41.62	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	400 Watts	6%	0 days	41.62	100.00	0.00

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	0%	12 days	40.99	99.80	.09
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	0%	8 days	41.06	99.86	.07
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	0%	4 days	41.27	99.97	.01
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	0%	0 days	41.97	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	2%	12 days	41.43	99.99	.00
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	2%	8 days	41.55	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	2%	4 days	41.80	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	2%	0 days	42.32	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	4%	12 days	42.15	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	4%	8 days	42.28	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	4%	4 days	42.45	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	4%	0 days	42.67	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	6%	12 days	43.01	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	6%	8 days	43.01	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	6%	4 days	43.01	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	500 Watts	6%	0 days	43.01	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	0%	12 days	42.69	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	0%	8 days	42.76	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	0%	4 days	43.00	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	0%	0 days	43.80	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	2%	12 days	43.13	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	2%	8 days	43.27	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	2%	4 days	43.55	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	2%	0 days	44.14	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	4%	12 days	43.90	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	4%	8 days	44.05	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	4%	4 days	44.24	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	4%	0 days	44.49	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	6%	12 days	44.84	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	6%	8 days	44.84	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	6%	4 days	44.84	100.00	0.00
BDU+BDO IV	FM 21-10 VARIANT	600 Watts	6%	0 days	44.84	100.00	0.00
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	0%	12 days	37.55	.01	99.99
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	0%	8 days	37.59	.01	99.99
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	0%	4 days	37.70	.03	99.97
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	0%	0 days	38.09	.32	99.68
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	2%	12 days	37.95	.14	99.86
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	2%	8 days	38.02	.22	99.78
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	2%	4 days	38.15	.48	99.52
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	2%	0 days	38.43	2.00	98.00
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	4%	12 days	38.50	2.71	97.29
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	4%	8 days	38.57	3.70	96.30
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	4%	4 days	38.66	5.36	94.64
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	4%	0 days	38.78	8.27	91.73
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	6%	12 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	6%	8 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	6%	4 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-40 VARIANT	105 Watts	6%	0 days	39.13	23.60	76.40
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	0%	12 days	37.67	.02	37.99
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	0%	8 days	37.71	.03	37.99
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	0%	4 days	37.83	.07	37.97
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	0%	0 days	38.24	.76	37.71
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	2%	12 days	38.07	.30	37.89
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	2%	8 days	38.14	.45	37.83
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	2%	4 days	38.29	.98	37.63
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	2%	0 days	38.58	3.91	36.51
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	4%	12 days	38.63	4.79	36.18
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	4%	8 days	38.71	6.45	35.55
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	4%	4 days	38.81	9.16	34.52
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	4%	0 days	38.93	13.97	32.69
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	6%	12 days	39.28	33.49	25.27
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	6%	8 days	39.28	33.49	25.27
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	6%	4 days	39.28	33.49	25.27
BDU+BDO IV	FM 21-40 VARIANT	150 Watts	6%	0 days	39.28	33.49	25.27

Clothing	Thermal Discipline	Metabolic Rate	Dehydration Levels	Acclimation Levels	Highest Core Temperature (oC)	Casualty (%)	Productivity (%)
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	0%	12 days	38.16	.48	16.92
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	0%	8 days	38.19	.60	16.90
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	0%	4 days	38.33	1.19	16.80
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	0%	0 days	38.77	7.95	15.65
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	2%	12 days	38.56	3.48	16.41
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	2%	8 days	38.63	4.75	16.19
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	2%	4 days	38.79	8.55	15.55
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	2%	0 days	39.11	22.93	13.10
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	4%	12 days	39.14	24.14	12.90
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	4%	8 days	39.22	29.41	12.00
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	4%	4 days	39.33	36.82	10.74
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	4%	0 days	39.46	47.06	9.00
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	6%	12 days	39.81	72.36	4.70
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	6%	8 days	39.81	72.36	4.70
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	6%	4 days	39.81	72.36	4.70
BDU+BDO IV	FM 21-40 VARIANT	300 Watts	6%	0 days	39.81	72.36	4.70
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	0%	12 days	38.61	4.38	16.26
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	0%	8 days	38.66	5.22	16.11
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	0%	4 days	38.80	9.02	15.47
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	0%	0 days	39.31	35.57	10.95
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	2%	12 days	39.02	17.79	13.98
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	2%	8 days	39.11	22.38	13.20
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	2%	4 days	39.28	33.77	11.26
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	2%	0 days	39.65	61.67	6.52
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	4%	12 days	39.63	59.80	6.83
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	4%	8 days	39.72	66.65	5.67
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	4%	4 days	39.85	74.66	4.31
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	4%	0 days	40.00	83.25	2.85
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	6%	12 days	40.35	94.86	.87
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	6%	8 days	40.35	94.86	.87
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	6%	4 days	40.35	94.86	.87
BDU+BDO IV	FM 21-40 VARIANT	400 Watts	6%	0 days	40.35	94.86	.87
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	0%	12 days	37.55	.01	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	0%	8 days	37.59	.01	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	0%	4 days	37.70	.03	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	0%	0 days	38.09	.32	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	2%	12 days	37.95	.14	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	2%	8 days	38.02	.22	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	2%	4 days	38.15	.48	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	2%	0 days	38.43	2.00	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	4%	12 days	38.50	2.71	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	4%	8 days	38.57	3.70	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	4%	4 days	38.66	5.36	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	4%	0 days	38.78	8.27	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	6%	12 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	6%	8 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	6%	4 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40 VARIANT	500 Watts	6%	0 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	0%	12 days	37.55	.01	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	0%	8 days	37.59	.01	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	0%	4 days	37.70	.03	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	0%	0 days	38.09	.32	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	2%	12 days	37.95	.14	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	2%	8 days	38.02	.22	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	2%	4 days	38.15	.48	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	2%	0 days	38.43	2.00	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	4%	12 days	38.50	2.71	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	4%	8 days	38.57	3.70	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	4%	4 days	38.66	5.36	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	4%	0 days	38.78	8.27	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	6%	12 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	6%	8 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	6%	4 days	39.13	23.60	0.00
BDU+BDO IV	FM 21-40 VARIANT	600 Watts	6%	0 days	39.13	23.60	0.00

135

APPENDIX E:
Statistical Analysis of Study Results

set more=off.
include final.cmd.
get file='c:\workrest\aresults.sys'.
The SPSS/PC+ system file is read from
    file c:\workrest\aresults.sys
The file was created on 10/12/90 at 15:30:53
and is titled   SPSS/PC+
The SPSS/PC+ system file contains
    288 cases, each consisting of
     39 variables (including system variables).
     39 variables will be used in this session.

Page   2   SPSS/PC+   10/12/90

This procedure was completed at 17:37:33
t-test pairs=a1 a2 a3 a4 a5 a6 a7 a8.

Page   3   SPSS/PC+   10/12/90

Paired samples t-test: A1   Productivity-NONE
                        A2   Productivity-FM 21-10

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A1	288	44.3511	43.524	2.565
A2	288	37.1165	33.772	1.990

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
7.2346	23.463	1.383	.845	.000	5.23	287	.000

Page   4   SPSS/PC+   10/12/90

Paired samples t-test: A1   Productivity-NONE
                        A3   Productivity-Tre39oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A1	288	44.3511	43.524	2.565
A3	288	55.1327	35.711	2.104

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-10.7816	15.462	.911	.943	.000	-11.83	287	.000

Page   5   SPSS/PC+   10/12/90

Paired samples t-test: A1   Productivity-NONE
                        A4   Productivity-Tre38.5oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error

```
A1                288      44.3511      43.524      2.565
A4                288      43.8926      40.141      2.365


 (Difference) Standard    Standard   |    2-Tail    |    t    Degrees of  2-Tail
     Mean    Deviation     Error     | Corr. Prob.  |  Value   Freedom    Prob.

     .4585     22.038       1.299     |  .864  .000  |   .35      287      .724
------------------------------------------------------------------------------
```

```
Paired samples t-test:    A1        Productivity-NONE
                          A5        Productivity-Tre38oC

Variable     Number                Standard    Standard
           of Cases     Mean      Deviation     Error

A1             288      44.3511      43.524      2.565
A5             288      30.3193      39.779      2.344


 (Difference) Standard    Standard   |    2-Tail    |    t    Degrees of  2-Tail
     Mean    Deviation     Error     | Corr. Prob.  |  Value   Freedom    Prob.

   14.0318     28.807       1.697     |  .764  .000  |  8.27      287      .000
------------------------------------------------------------------------------
```

```
Paired samples t-test:    A1        Productivity-NONE
                          A6        Productivity-FM 21-40

Variable     Number                Standard    Standard
           of Cases     Mean      Deviation     Error

A1             288      44.3511      43.524      2.565
A6             288      29.8828      37.856      2.231 (Difference) Standard    Standard   |
 2-Tail  |    t    Degrees of  2-Tail
     Mean    Deviation     Error     | Corr. Prob.  |  Value   Freedom    Prob.

   14.4683     26.869       1.583     |  .791  .000  |  9.14      287      .000
------------------------------------------------------------------------------
```

```
Paired samples t-test:    A1        Productivity-NONE
                          A7        Productivity-FM 21-10 Variant

Variable     Number                Standard    Standard
           of Cases     Mean      Deviation     Error

A1             288      44.3511      43.524      2.565
A7             288      42.4142      40.525      2.388


 (Difference) Standard    Standard   |    2-Tail    |    t    Degrees of  2-Tail
     Mean    Deviation     Error     | Corr. Prob.  |  Value   Freedom    Prob.

    1.9369     11.899        .701     |  .962  .000  |  2.76      287      .006
------------------------------------------------------------------------------
```

Paired samples t-test: A1   Productivity-NONE
                        A8   Productivity-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A1	288	44.3511	43.524	2.565
A8	288	33.5120	36.547	2.154

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
10.8390	22.704	1.338	.853	.000	8.10	287	.000

Page 10   SPSS/PC+   10/12/90

Paired samples t-test: A2   Productivity-FM 21-10
                        A3   Productivity-Tre39oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A2	288	37.1165	33.772	1.990
A3	288	55.1327	35.711	2.104

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-18.0162	18.764	1.106	.856	.000	-16.29	287	.000

Page 11   SPSS/PC+   10/12/90

Paired samples t-test: A2   Productivity-FM 21-10
                        A4   Productivity-Tre38.5oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A2	288	37.1165	33.772	1.990
A4	288	43.8926	40.141	2.365

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-6.7761	22.053	1.299	.836	.000	-5.21	287	.000

Page 12   SPSS/PC+   10/12/90

Paired samples t-test: A2   Productivity-FM 21-10
                        A5   Productivity-Tre38oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A2	288	37.1165	33.772	1.990
A5	288	30.3193	39.779	2.344

139

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr. Prob.		t Value	Degrees of Freedom	2-Tail Prob.
6.7972	21.845	1.287	.836	.000	5.28	287	.000

SPSS/PC+

Paired samples t-test: A2   Productivity-FM 21-10
                           A6   Productivity-FM 21-40

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A2	288	37.1165	33.772	1.990
A6	288	29.8828	37.856	2.231

(Difference) Standard   Standard

2-Tail Mean	t Deviation	Degrees of 2-Tail Error	Corr. Prob.		Value	Freedom	Prob.
7.2337	14.430	.850	.925	.000	8.51	287	.000

SPSS/PC+

Paired samples t-test: A2   Productivity-FM 21-10
                           A7   Productivity-FM 21-10 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A2	288	37.1165	33.772	1.990
A7	288	42.4142	40.525	2.388

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr. Prob.		t Value	Degrees of Freedom	2-Tail Prob.
-5.2977	18.750	1.105	.888	.000	-4.79	287	.000

SPSS/PC+

Paired samples t-test: A2   Productivity-FM 21-10
                           A8   Productivity-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A2	288	37.1165	33.772	1.990
A8	288	33.5120	36.547	2.154

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr. Prob.		t Value	Degrees of Freedom	2-Tail Prob.
3.6045	11.022	.649	.954	.000	5.55	287	.000

SPSS/PC+

Paired samples t-test: A3   Productivity-Tre39oC
                           A4   Productivity-Tre38.5oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A3	288	55.1327	35.711	2.104
A4	288	43.8926	40.141	2.365

(Difference) Mean	Standard Deviation	Standard Error		Corr.	2-Tail Prob.		t Value	Degrees of Freedom	2-Tail Prob.
11.2401	15.452	.911		.924	.000		12.34	287	.000

Page 17   SPSS/PC+   10/12/90

Paired samples t-test: A3   Productivity-Tre39oC
                         A5   Productivity-Tre38oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A3	288	55.1327	35.711	2.104
A5	288	30.3193	39.779	2.344

(Difference) Mean	Standard Deviation	Standard Error		Corr.	2-Tail Prob.		t Value	Degrees of Freedom	2-Tail Prob.
24.8134	25.185	1.484		.783	.000		16.72	287	.000

Page 18   SPSS/PC+   10/12/90

Paired samples t-test: A3   Productivity-Tre39oC
                         A6   Productivity-FM 21-40

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A3	288	55.1327	35.711	2.104
A6	288	29.8828	37.856	2.231

(Difference) Mean	Standard Deviation	Standard Error		Corr.	2-Tail Prob.		t Value	Degrees of Freedom	2-Tail Prob.
25.2499	25.389	1.496		.763	.000		16.88	287	.000

Page 19   SPSS/PC+   10/12/90

Paired samples t-test: A3   Productivity-Tre39oC
                         A7   Productivity-FM 21-10 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A3	288	55.1327	35.711	2.104
A7	288	42.4142	40.525	2.388

| (Difference) Standard | Standard | | 2-Tail | | t | Degrees of | 2-Tail |

141

Mean	Deviation	Error		Corr.	Prob.		Value	Freedom		Prob.
12.7185	15.363	.905		.926	.000		14.05	287		.000

Paired samples t-test: A3   Productivity-Tre39oC
                         A8   Productivity-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A3	288	55.1327	35.711	2.104
A8	288	33.5120	36.547	2.154

(Difference) Mean	Standard Deviation	Standard Error		2-Tail Corr.	Prob.		t Value	Degrees of Freedom	2-Tail Prob.
21.6207	21.499	1.267		.823	.000		17.07	287	.000

Paired samples t-test: A4   Productivity-Tre38.5oC
                         A5   Productivity-Tre38oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A4	288	43.8926	40.141	2.365
A5	288	30.3193	39.779	2.344

(Difference) Mean	Standard Deviation	Standard Error		2-Tail Corr.	Prob.		t Value	Degrees of Freedom	2-Tail Prob.
13.5733	19.901	1.173		.876	.000		11.57	287	.000

Paired samples t-test: A4   Productivity-Tre38.5oC
                         A6   Productivity-FM 21-40

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A4	288	43.8926	40.141	2.365
A6	288	29.8828	37.856	2.231

(Difference) Mean	Standard Deviation	Standard Error		2-Tail Corr.	Prob.		t Value	Degrees of Freedom	2-Tail Prob.
14.0098	27.873	1.642		.746	.000		8.53	287	.000

Paired samples t-test: A4   Productivity-Tre38.5oC
                         A7   Productivity-FM 21-10 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A4	288	43.8926	40.141	2.365
A7	288	42.4142	40.525	2.388

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
1.4784	21.283	1.254	.861	.000	1.18	287	.239

Paired samples t-test: A4   Productivity-Tre38.5oC
                        A8   Productivity-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A4	288	43.8926	40.141	2.365
A8	288	33.5120	36.547	2.154

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
10.3805	25.068	1.477	.790	.000	7.03	287	.000

Paired samples t-test: A5   Productivity-Tre38oC
                        A6   Productivity-FM 21-40

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A5	288	30.3193	39.779	2.344
A6	288	29.8828	37.856	2.231

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
.4365	25.415	1.498	.787	.000	.29	287	.771

Paired samples t-test: A5   Productivity-Tre38oC
                        A7   Productivity-FM 21-10 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A5	288	30.3193	39.779	2.344
A7	288	42.4142	40.525	2.388

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.

| -12.0949 | 26.092 | 1.537 | .789 | .000 | -7.87 | 287 | .000 |

Paired samples t-test: A5   Productivity-Tre38oC
                        A8   Productivity-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A5	288	30.3193	39.779	2.344
A8	288	33.5120	36.547	2.154

(Difference) Mean	Standard Deviation	Standard Error	Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-3.1927	24.025	1.416	.805	.000	-2.26	287	.025

Paired samples t-test: A6   Productivity-FM 21-40
                        A7   Productivity-FM 21-10 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A6	288	29.8828	37.856	2.231
A7	288	42.4142	40.525	2.388

(Difference) Mean	Standard Deviation	Standard Error	Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-12.5314	24.454	1.441	.807	.000	-8.70	287	.000

Paired samples t-test: A6   Productivity-FM 21-40
                        A8   Productivity-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A6	288	29.8828	37.856	2.231
A8	288	33.5120	36.547	2.154

(Difference) Mean	Standard Deviation	Standard Error	Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-3.6292	6.263	.369	.986	.000	-9.83	287	.000

Paired samples t-test: A7   Productivity-FM 21-10 Variant
                        A8   Productivity-FM 21-40 Variant

144

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
A7	288	42.4142	40.525	2.388
A8	288	33.5120	36.547	2.154

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
8.9021	19.986	1.178	.870	.000	7.56	287	.000

This procedure was completed at 17:37:39
t-test pairs=c1 c2 c3 c4 c5 c6 c7 c8.

Paired samples t-test: C1   Casualty-NONE
                        C2   Casualty-FM 21-10

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C1	288	55.6489	43.524	2.565
C2	288	39.0886	39.273	2.314

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
16.5603	24.002	1.414	.837	.000	11.71	287	.000

Paired samples t-test: C1   Casualty-NONE
                        C3   Casualty-Tre39oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C1	288	55.6489	43.524	2.565
C3	288	13.7300	8.039	.474

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
41.9189	37.071	2.184	.836	.000	19.19	287	.000

Paired samples t-test: C1   Casualty-NONE
                        C4   Casualty-Tre38.5oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error

145

C1	288	55.6489	43.524	2.565
C4	288	5.4576	7.367	.434

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
50.1913	42.376	2.497	.238	.000	20.10	287	.000

Paired samples t-test: C1   Casualty-NONE
                        C5   Casualty-Tre38oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C1	288	55.6489	43.524	2.565
C5	288	4.0370	6.669	.393

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
51.6119	42.356	2.496	.249	.000	20.68	287	.000

Paired samples t-test: C1   Casualty-NONE
                        C6   Casualty-FM 21-40

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C1	288	55.6489	43.524	2.565
C6	288	12.7119	22.889	1.349

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
42.9370	41.358	2.437	.355	.000	17.62	287	.000

Paired samples t-test: C1   Casualty-NONE
                        C7   Casualty-FM 21-10 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C1	288	55.6489	43.524	2.565
C7	288	51.8884	43.276	2.550

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
3.7605	7.749	.457	.984	.000	8.24	287	.000

Paired samples t-test: C1   Casualty-NONE
                         C8   Casualty-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C1	288	55.6489	43.524	2.565
C8	288	20.6233	29.853	1.759

(Difference) Mean	Standard Deviation	Standard Error	Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
35.0257	38.236	2.253	.509	.000	15.55	287	.000

Paired samples t-test: C2   Casualty-FM 21-10
                         C3   Casualty-Tre39oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C2	288	39.0886	39.273	2.314
C3	288	13.7300	8.039	.474

(Difference) Mean	Standard Deviation	Standard Error	Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
25.3586	34.436	2.029	.667	.000	12.50	287	.000

Paired samples t-test: C2   Casualty-FM 21-10
                         C4   Casualty-Tre38.5oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C2	288	39.0886	39.273	2.314
C4	288	5.4576	7.367	.434

(Difference) Mean	Standard Deviation	Standard Error	Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
33.6310	37.604	2.216	.316	.000	15.18	287	.000

Paired samples t-test: C2   Casualty-FM 21-10
                         C5   Casualty-Tre38oC

| Variable | Number | | Standard | Standard |

147

	of Cases	Mean	Deviation	Error
C2	288	39.0886	39.273	2.314
C5	288	4.0370	6.669	.393

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
35.0516	37.072	2.185	.406	.000	16.05	287	.000

Paired samples t-test: C2   Casualty-FM 21-10
                        C6   Casualty-FM 21-40

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C2	288	39.0886	39.273	2.314
C6	288	12.7119	22.889	1.349

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
26.3768	32.837	1.935	.550	.000	13.63	287	.000

Paired samples t-test: C2   Casualty-FM 21-10
                        C7   Casualty-FM 21-10 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C2	288	39.0886	39.273	2.314
C7	288	51.8884	43.276	2.550

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-12.7998	19.747	1.164	.890	.000	-11.00	287	.000

Paired samples t-test: C2   Casualty-FM 21-10
                        C8   Casualty-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C2	288	39.0886	39.273	2.314
C8	288	20.6233	29.853	1.759

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.

```
  18.4654      30.208       1.780   |   .649   .000  |  10.37      287         .000
-------------------------------------------------------------------------------------
```

Paired samples t-test: C3   Casualty-Tre39oC
                         C4   Casualty-Tre38.5oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C3	288	13.7300	8.039	.474
C4	288	5.4576	7.367	.434

```
(Difference) Standard    Standard   |    2-Tail     |    t     Degrees of  2-Tail
   Mean     Deviation     Error     | Corr. Prob.   |  Value    Freedom     Prob.

  8.2724     8.175        .482      |  .440   .000  |  17.17      287         .000
-------------------------------------------------------------------------------------
```

Paired samples t-test: C3   Casualty-Tre39oC
                         C5   Casualty-Tre38oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C3	288	13.7300	8.039	.474
C5	288	4.0370	6.669	.393

```
(Difference) Standard    Standard   |    2-Tail     |    t     Degrees of  2-Tail
   Mean     Deviation     Error     | Corr. Prob.   |  Value    Freedom     Prob.

  9.6930     8.185        .482      |  .393   .000  |  20.10      287         .000
-------------------------------------------------------------------------------------
```

Paired samples t-test: C3   Casualty-Tre39oC
                         C6   Casualty-FM 21-40

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C3	288	13.7300	8.039	.474
C6	288	12.7119	22.889	1.349

```
(Difference) Standard    Standard   |    2-Tail     |    t     Degrees of  2-Tail
   Mean     Deviation     Error     | Corr. Prob.   |  Value    Freedom     Prob.

  1.0181     21.354       1.258     |  .360   .000  |   .81      287         .419
-------------------------------------------------------------------------------------
```

Paired samples t-test: C3   Casualty-Tre39oC
                         C7   Casualty-FM 21-10 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C3	288	13.7300	8.039	.474
C7	288	51.8884	43.276	2.550

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-38.1584	37.255	2.195	.790	.000	-17.38	287	.000

Page 49   SPSS/PC+   10/12/90

Paired samples t-test: C3   Casualty-Tre39oC
                           C8   Casualty-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C3	288	13.7300	8.039	.474
C8	288	20.6233	29.853	1.759

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-6.8933	27.101	1.597	.461	.000	-4.32	287	.000

Page 50   SPSS/PC+   10/12/90

Paired samples t-test: C4   Casualty-Tre38.5oC
                           C5   Casualty-Tre38oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C4	288	5.4576	7.367	.434
C5	288	4.0370	6.669	.393

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
1.4206	3.213	.189	.900	.000	7.50	287	.000

Page 51   SPSS/PC+   10/12/90

Paired samples t-test: C4   Casualty-Tre38.5oC
                           C6   Casualty-FM 21-40

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C4	288	5.4576	7.367	.434
C6	288	12.7119	22.889	1.349

(Difference) Standard	Standard		2-Tail		t	Degrees of	2-Tail

150

Mean	Deviation	Error	Corr. Prob.	Value	Freedom	Prob.
-7.2542	22.094	1.302	.267 .000	-5.57	287	.000

Paired samples t-test: C4   Casualty-Tre38.5oC
                        C7   Casualty-FM 21-10 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C4	288	5.4576	7.367	.434
C7	288	51.8884	43.276	2.550

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr. Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-46.4308	42.251	2.490	.223 .000	-18.65	287	.000

Paired samples t-test: C4   Casualty-Tre38.5oC
                        C8   Casualty-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C4	288	5.4576	7.367	.434
C8	288	20.6233	29.853	1.759

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr. Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-15.1656	28.433	1.675	.312 .000	-9.05	287	.000

Paired samples t-test: C5   Casualty-Tre38oC
                        C6   Casualty-FM 21-40

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C5	288	4.0370	6.669	.393
C6	288	12.7119	22.889	1.349

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr. Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-8.6748	21.917	1.291	.288 .000	-6.72	287	.000

Paired samples t-test: C5   Casualty-Tre38oC

151

```
                           C7          Casualty-FM 21-10 Variant

Variable        Number                  Standard    Standard
               of Cases      Mean       Deviation    Error

C5               288        4.0370        6.669       .393
C7               288       51.8884       43.276      2.550


(Difference) Standard    Standard    |      2-Tail  |   t      Degrees of  2-Tail
    Mean     Deviation     Error      |  Corr. Prob. | Value    Freedom     Prob.

  -47.8514    42.034       2.477      |   .261  .000 | -19.32     287        .000
------------------------------------------------------------------------------
Page  56                              SPSS/PC+                         10/12/90


Paired samples t-test:  C5          Casualty-Tre38oC
                        C8          Casualty-FM 21-40 Variant

Variable        Number                  Standard    Standard
               of Cases      Mean       Deviation    Error

C5               288        4.0370        6.669       .393
C8               288       20.6233       29.853      1.759
(Difference) Standard    Standard    |      2-Tail  |   t      Degrees of  2-Tail
    Mean     Deviation     Error      |  Corr. Prob. | Value    Freedom     Prob.

  -16.5862    28.021       1.651      |   .378  .000 | -10.05     287        .000
------------------------------------------------------------------------------
Page  57                              SPSS/PC+                         10/12/90


Paired samples t-test:  C6          Casualty-FM 21-40
                        C7          Casualty-FM 21-10 Variant

Variable        Number                  Standard    Standard
               of Cases      Mean       Deviation    Error

C6               288       12.7119       22.889      1.349
C7               288       51.8884       43.276      2.550


(Difference) Standard    Standard    |      2-Tail  |   t      Degrees of  2-Tail
    Mean     Deviation     Error      |  Corr. Prob. | Value    Freedom     Prob.

  -39.1766    40.337       2.377      |   .388  .000 | -16.48     287        .000
------------------------------------------------------------------------------
Page  58                              SPSS/PC+                         10/12/90


Paired samples t-test:  C6          Casualty-FM 21-40
                        C8          Casualty-FM 21-40 Variant

Variable        Number                  Standard    Standard
               of Cases      Mean       Deviation    Error

C6               288       12.7119       22.889      1.349
C8               288       20.6233       29.853      1.759


(Difference) Standard    Standard    |      2-Tail  |   t      Degrees of  2-Tail
```

Mean	Deviation	Error	Corr.	Prob.	Value	Freedom	Prob.
-7.9114	16.432	.968	.838	.000	-8.17	287	.000

Paired samples t-test: C7   Casualty-FM 21-10 Variant
                         C8   Casualty-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
C7	288	51.8884	43.276	2.550
C8	288	20.6233	29.853	1.759

(Difference) Mean	Standard Deviation	Standard Error	Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
31.2652	37.103	2.186	.537	.000	14.30	287	.000

This procedure was completed at 17:37:44
t-test pairs=t1 t2 t3 t4 t5 t6 t7 t8.

Paired samples t-test: T1   Core Temp-NONE
                         T2   Core Temp-FM 21-10

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T1	288	40.1863	2.068	.122
T2	288	39.2049	1.079	.064

(Difference) Mean	Standard Deviation	Standard Error	Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
.9813	1.241	.073	.874	.000	13.42	287	.000

Paired samples t-test: T1   Core Temp-NONE
                         T3   Core Temp-Tre39oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T1	288	40.1863	2.068	.122
T3	288	38.7635	.493	.029

(Difference) Mean	Standard Deviation	Standard Error	Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
1.4227	1.794	.106	.638	.000	13.46	287	.000

Paired samples t-test: T1   Core Temp-NONE
                          T4   Core Temp-Tre38.5oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T1	288	40.1863	2.068	.122
T4	288	38.4967	.398	.023

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
1.6895	1.884	.111	.539	.000	15.22	287	.000

Paired samples t-test: T1   Core Temp-NONE
                          T5   Core Temp-Tre38oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T1	288	40.1863	2.068	.122
T5	288	38.2955	.441	.026

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
1.8908	1.905	.112	.463	.000	16.84	287	.000

Paired samples t-test: T1   Core Temp-NONE
                          T6   Core Temp-FM 21-40

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T1	288	40.1863	2.068	.122
T6	288	38.4631	.740	.044

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
1.7232	1.974	.116	.303	.000	14.81	287	.000

Paired samples t-test: T1   Core Temp-NONE
                          T7   Core Temp-FM 21-10 Variant

Variable   Number   Standard   Standard

154

```
                  of Cases       Mean      Deviation       Error

T1                  288        40.1863       2.068          .122
T7                  288        39.8494       1.711          .101


(Difference) Standard    Standard    │      2-Tail   │     t      Degrees of   2-Tail
   Mean     Deviation     Error      │  Corr.  Prob. │   Value    Freedom      Prob.

   .3369      .429         .025      │  .992   .000  │   13.34      287         .000
--------------------------------------------------------------------------------------
Page  67                            SPSS/PC+                              10/12/90


Paired samples t-test:   T1          Core Temp-NONE
                         T8          Core Temp-FM 21-40 Variant

Variable       Number               Standard     Standard
               of Cases     Mean    Deviation      Error

T1                288       40.1863    2.068         .122
T8                288       38.6944     .843         .050


(Difference) Standard    Standard    │      2-Tail   │     t      Degrees of   2-Tail
   Mean     Deviation     Error      │  Corr.  Prob. │   Value    Freedom      Prob.

  1.4918     1.973         .116      │  .314   .000  │   12.83      287         .000
--------------------------------------------------------------------------------------
Page  68                            SPSS/PC+                              10/12/90


Paired samples t-test:   T2          Core Temp-FM 21-10
                         T3          Core Temp-Tre39oC

Variable       Number               Standard     Standard
               of Cases     Mean    Deviation      Error

T2                288       39.2049    1.079         .064
T3                288       38.7635     .493         .029


(Difference) Standard    Standard    │      2-Tail   │     t      Degrees of   2-Tail
   Mean     Deviation     Error      │  Corr.  Prob. │   Value    Freedom      Prob.

   .4414      .789         .046      │  .738   .000  │   9.50       287         .000
--------------------------------------------------------------------------------------
Page  69                            SPSS/PC+                              10/12/90


Paired samples t-test:   T2          Core Temp-FM 21-10
                         T4          Core Temp-Tre38.5oC

Variable       Number               Standard     Standard
               of Cases     Mean    Deviation      Error

T2                288       39.2049    1.079         .064
T4                288       38.4967     .398         .023


(Difference) Standard    Standard    │      2-Tail   │     t      Degrees of   2-Tail
   Mean     Deviation     Error      │  Corr.  Prob. │   Value    Freedom      Prob.
```

155

```
    .7082          .859          .051     |    .680   .000  |  13.99      287          .000
-------------------------------------------------------------------------------------------
```

Paired samples t-test: T2   Core Temp-FM 21-10
                          T5   Core Temp-Tre38oC

```
Variable      Number                 Standard    Standard
              of Cases     Mean      Deviation    Error

T2              288       39.2049      1.079       .064
T5              288       38.2955       .441       .026
```

```
(Difference) Standard    Standard   |    2-Tail      |    t      Degrees of  2-Tail
   Mean      Deviation     Error    |  Corr.  Prob.  |  Value     Freedom     Prob.

    .9094        .863        .051    |   .645   .000  |  17.89      287         .000
-------------------------------------------------------------------------------------------
```

Paired samples t-test: T2   Core Temp-FM 21-10
                          T6   Core Temp-FM 21-40

```
Variable      Number                 Standard    Standard
              of Cases     Mean      Deviation    Error

T2              288       39.2049      1.079       .064
T6              288       38.4631       .740       .044
```

```
(Difference) Standard    Standard   |    2-Tail      |    t      Degrees of  2-Tail
   Mean      Deviation     Error    |  Corr.  Prob.  |  Value     Freedom     Prob.

    .7418        .762        .045    |   .709   .000  |  16.53      287         .000
-------------------------------------------------------------------------------------------
```

Paired samples t-test: T2   Core Temp-FM 21-10
                          T7   Core Temp-FM 21-10 Variant

```
Variable      Number                 Standard    Standard
              of Cases     Mean      Deviation    Error

T2              288       39.2049      1.079       .064
T7              288       39.8494      1.711       .101
```

```
(Difference) Standard    Standard   |    2-Tail      |    t      Degrees of  2-Tail
   Mean      Deviation     Error    |  Corr.  Prob.  |  Value     Freedom     Prob.

  -.6444        .825        .049    |   .924   .000  | -13.25      287         .000
-------------------------------------------------------------------------------------------
```

Paired samples t-test: T2   Core Temp-FM 21-10
                          T8   Core Temp-FM 21-40 Variant

156

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T2	288	39.2049	1.079	.064
T8	288	38.6944	.843	.050

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
.5105	.764	.045	.710	.000	11.34	287	.000

Page 74 SPSS/PC+ 10/12/90

Paired samples t-test: T3   Core Temp-Tre39oC
                             T4   Core Temp-Tre38.5oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T3	288	38.7635	.493	.029
T4	288	38.4967	.398	.023

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
.2668	.238	.014	.878	.000	19.00	287	.000

Page 75 SPSS/PC+ 10/12/90

Paired samples t-test: T3   Core Temp-Tre39oC
                             T5   Core Temp-Tre38oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T3	288	38.7635	.493	.029
T5	288	38.2955	.441	.026

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
.4681	.411	.024	.618	.000	19.32	287	.000

Page 76 SPSS/PC+ 10/12/90

Paired samples t-test: T3   Core Temp-Tre39oC
                             T6   Core Temp-FM 21-40

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T3	288	38.7635	.493	.029
T6	288	38.4631	.740	.044

(Difference) Standard	Standard		2-Tail		t	Degrees of	2-Tail

Mean	Deviation	Error	Corr.	Prob.	Value	Freedom	Prob.
.3005	.644	.038	.516	.000	7.92	287	.000

Paired samples t-test: T3   Core Temp-Tre39oC
                       T7   Core Temp-FM 21-10 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T3	288	38.7635	.493	.029
T7	288	39.8494	1.711	.101

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-1.0858	1.427	.084	.672	.000	-12.91	287	.000

Paired samples t-test: T3   Core Temp-Tre39oC
                       T8   Core Temp-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T3	288	38.7635	.493	.029
T8	288	38.6944	.843	.050

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
.0691	.678	.040	.594	.000	1.73	287	.085

Paired samples t-test: T4   Core Temp-Tre38.5oC
                       T5   Core Temp-Tre38oC

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T4	288	38.4967	.398	.023
T5	288	38.2955	.441	.026

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
.2012	.228	.013	.856	.000	14.94	287	.000

Paired samples t-test: T4   Core Temp-Tre38.5oC

| | T6 | Core Temp-FM 21-40 | |

```
                            T6         Core Temp-FM 21-40

Variable      Number                 Standard    Standard
            of Cases     Mean       Deviation    Error

T4             288       38.4967      .398        .023
T6             288       38.4631      .740        .044


(Difference) Standard   Standard  |    2-Tail    |   t    Degrees of  2-Tail
    Mean     Deviation    Error   | Corr.  Prob. | Value   Freedom    Prob.

    .0336       .592       .035    | .603   .000  |  .96      287      .336
------------------------------------------------------------------------------
```
Page 81   SPSS/PC+   10/12/90

```
Paired samples t-test:   T4        Core Temp-Tre38.5oC
                         T7        Core Temp-FM 21-10 Variant

Variable      Number                 Standard    Standard
            of Cases     Mean       Deviation    Error

T4             288       38.4967      .398        .023
T7             288       39.8494     1.711        .101


(Difference) Standard   Standard  |    2-Tail    |   t    Degrees of  2-Tail
    Mean     Deviation    Error   | Corr.  Prob. | Value   Freedom    Prob.

  -1.3527      1.518      .089    | .573   .000  | -15.12    287      .000
------------------------------------------------------------------------------
```
Page 82   SPSS/PC+   10/12/90

```
Paired samples t-test:   T4        Core Temp-Tre38.5oC
                         T8        Core Temp-FM 21-40 Variant

Variable      Number                 Standard    Standard
            of Cases     Mean       Deviation    Error

T4             288       38.4967      .398        .023
T8             288       38.6944      .843        .050


(Difference) Standard   Standard  |    2-Tail    |   t    Degrees of  2-Tail
    Mean     Deviation    Error   | Corr.  Prob. | Value   Freedom    Prob.

  -.1977       .671       .040    | .624   .000  | -5.00     287      .000
------------------------------------------------------------------------------
```
Page 83   SPSS/PC+   10/12/90

```
Paired samples t-test:   T5        Core Temp-Tre38oC
                         T6        Core Temp-FM 21-40

Variable      Number                 Standard    Standard
            of Cases     Mean       Deviation    Error

T5             288       38.2955      .441        .026
T6             288       38.4631      .740        .044
```

159

| (Difference) Standard | | Standard | | 2-Tail | | t | Degrees of | 2-Tail |
Mean	Deviation	Error		Corr.	Prob.	Value	Freedom	Prob.
-.1676	.540	.032		.689	.000	-5.26	287	.000

Paired samples t-test: T5   Core Temp-Tre38oC
                          T7   Core Temp-FM 21-10 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T5	288	38.2955	.441	.026
T7	288	39.8494	1.711	.101

| (Difference) Standard | | Standard | | 2-Tail | | t | Degrees of | 2-Tail |
Mean	Deviation	Error		Corr.	Prob.	Value	Freedom	Prob.
-1.5539	1.539	.091		.500	.000	-17.14	287	.000

Paired samples t-test: T5   Core Temp-Tre38oC
                          T8   Core Temp-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T5	288	38.2955	.441	.026
T8	288	38.6944	.843	.050

| (Difference) Standard | | Standard | | 2-Tail | | t | Degrees of | 2-Tail |
Mean	Deviation	Error		Corr.	Prob.	Value	Freedom	Prob.
-.3990	.645	.038		.658	.000	-10.50	287	.000

Paired samples t-test: T6   Core Temp-FM 21-40
                          T7   Core Temp-FM 21-10 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T6	288	38.4631	.740	.044
T7	288	39.8494	1.711	.101

| (Difference) Standard | | Standard | | 2-Tail | | t | Degrees of | 2-Tail |
Mean	Deviation	Error		Corr.	Prob.	Value	Freedom	Prob.
-1.3863	1.564	.092		.406	.000	-15.04	287	.000

Paired samples t-test: T6   Core Temp-FM 21-40
                          T8   Core Temp-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T6	288	38.4631	.740	.044
T8	288	38.6944	.843	.050

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-.2314	.352	.021	.909	.000	-11.15	287	.000

Paired samples t-test: T7   Core Temp-FM 21-10 Variant
                         T8   Core Temp-FM 21-40 Variant

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
T7	288	39.8494	1.711	.101
T8	288	38.6944	.843	.050

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
1.1549	1.568	.092	.408	.000	12.50	287	.000

This procedure was completed at 17:37:50
get file='c:\workrest\results.sys'.
The SPSS/PC+ system file is read from
    file c:\workrest\results.sys
The file was created on 10/12/90 at 15:33:30
and is titled   SPSS/PC+
The SPSS/PC+ system file contains
    2304 cases, each consisting of
    34 variables (including system variables).
    34 variables will be used in this session.

This procedure was completed at 17:37:50
anova product by discip(1,8) with met dehyd acclim.

'ANOVA' PROBLEM REQUIRES   1632 BYTES OF MEMORY.

                  * * *   A N A L Y S I S   O F   V A R I A N C E   * * *

              PRODUCT   PERCENT PRODUCTIVITY
        BY   DISCIP   THERMAL DISCIPLINE
        WITH MET   DEMANDED METABOLIC RATE (Watts)
              DEHYD   DEHYDRATION (%)
              ACCLIM   ACCLIMATIZATION (days)

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F

161

Covariates	2233014.592	3	744338.197	1438.425	.000
MET	1874497.761	1	1874497.761	3622.446	.000
DEHYD	330901.494	1	330901.494	639.464	.000
ACCLIM	27615.337	1	27615.337	53.366	.000
Main Effects	148021.919	7	21145.988	40.864	.000
DISCIP	148021.919	7	21145.988	40.864	.000

Explained	2381036.511	10	238103.651	460.133	.000
Residual	1186552.632	2293	517.467		
Total	3567589.143	2303	1549.105		

     2304 Cases were processed.
        0 Cases (.0 PCT) were missing.

This procedure was completed at 17:37:56
get file='c:\workrest\results.sys'.
The SPSS/PC+ system file is read from
     file c:\workrest\results.sys

This procedure was completed at 17:37:57
select if (dehyd eq 0 or dehyd eq 1).
select if (cloth eq 1).
oneway product by discip(1,8)/ranges=lsd(.5)/statistics=1.
The raw data or transformation pass is proceeding
     192 cases are written to the uncompressed active file.

          - - - - - - - - - - O N E W A Y - - - - - - - - - - -

     Variable PRODUCT   PERCENT PRODUCTIVITY

     By Variable DISCIP   THERMAL DISCIPLINE

                         Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	7	15582.8027	2226.1147	2.8376	.0078
Within Groups	184	144350.7989	784.5152		
Total	191	159933.6015			

          - - - - - - - - - - O N E W A Y - - - - - - - - - - -

                         Standard   Standard

Group	Count	Mean	Deviation	Error	95 Pct Conf Int for Mean		
Grp 1	24	77.9567	32.2427	6.5815	64.3417	To	91.5716
Grp 2	24	67.4171	24.4058	4.9818	57.1114	To	77.7228
Grp 3	24	85.9570	18.9688	3.8720	77.9472	To	93.9668
Grp 4	24	81.8043	22.9626	4.6872	72.1081	To	91.5006
Grp 5	24	68.4578	31.3366	6.3966	55.2255	To	81.6900
Grp 6	24	58.8353	30.2049	6.1656	46.0808	To	71.5897
Grp 7	24	73.4850	31.1350	6.3554	60.3378	To	86.6321
Grp 8	24	61.3284	29.8342	6.0899	48.7305	To	73.9263
Total	192	71.9052	28.9370	2.0883	67.7860	To	76.0244

Group	Minimum	Maximum
Grp 1	.4700	100.0000
Grp 2	1.7550	100.0000
Grp 3	37.9525	100.0000

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

Group	Minimum	Maximum
Grp 4	29.0460	100.0000
Grp 5	13.9678	100.0000
Grp 6	19.3800	100.0000
Grp 7	.3813	100.0000
Grp 8	6.5428	100.0000
Total	.3813	100.0000

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

```
     Variable  PRODUCT      PERCENT PRODUCTIVITY
  By Variable  DISCIP       THERMAL DISCIPLINE
```

Multiple Range Test

LSD Procedure
Ranges for the   .500 level -

```
          .96     .96     .96     .96     .96     .96     .96
```

The ranges above are table ranges.
The value actually compared with Mean(J)-Mean(I) is..
     19.8055 * Range * Sqrt(1/N(I) + 1/N(J))

(*) Denotes pairs of groups significantly different at the   .500 level

---

163

Variable PRODUCT   PERCENT PRODUCTIVITY
(Continued)

```
                        G G G G G G G G
                        r r r r r r r r
                        p p p p p p p p

     Mean       Group   6 8 2 5 7 1 4 3

   58.8353     Grp 6
   61.3284     Grp 8
   67.4171     Grp 2     * *
   68.4578     Grp 5     * *
   73.4850     Grp 7     * * *
   77.9567     Grp 1     * * * *
   81.8043     Grp 4     * * * * *
   85.9570     Grp 3     * * * * * *
```

Homogeneous Subsets   (Subsets of groups, whose highest and lowest means
                         do not differ by more than the shortest
                         significant range for a subset of that size)

SUBSET   1

Group   Grp 6   Grp 8
Mean   58.8353   61.3284
- - - - - - - - - - - - - - - - -

SUBSET   2

Group   Grp 2   Grp 5
Mean   67.4171   68.4578
- - - - - - - - - - - - - - - - -

SUBSET   3

Group   Grp 5   Grp 7
Mean   68.4578   73.4850
- - - - - - - - - - - - - - - - -

SUBSET   4

Group   Grp 7   Grp 1
Mean   73.4850   77.9567
- - - - - - - - - - - - - - - - -

SUBSET   5

Group   Grp 1   Grp 4
Mean   77.9567   81.8043
- - - - - - - - - - - - - - - - -

SUBSET   6

```
Group        Grp 4        Grp 3
Mean         81.8043      85.9570
- - - - - - - - - - - - - - - -
```

This procedure was completed at 17:38:07
get file='c:\workrest\results.sys'.
The SPSS/PC+ system file is read from
    file c:\workrest\results.sys

This procedure was completed at 17:38:08
select if (dehyd eq 0 or dehyd eq 1).
select if (cloth eq 2).
oneway product by discip(1,8)/ranges=lsd(.5)/statistics=1.
The raw data or transformation pass is proceeding
    192 cases are written to the uncompressed active file.

          - - - - - - - - - - O N E W A Y - - - - - - - - - - -

       Variable   PRODUCT   PERCENT PRODUCTIVITY

    By Variable   DISCIP   THERMAL DISCIPLINE

                          Analysis of Variance

                              Sum of   Mean   F   F
          Source   D.F.   Squares   Squares   Ratio   Prob.

Between Groups   7   65130.7411   9304.3916   7.8970   .0000

Within Groups   184   216790.9658   1178.2118

Total   191   281921.7070

          - - - - - - - - - - O N E W A Y - - - - - - - - - - -

| | | | Standard | Standard | |
Group	Count	Mean	Deviation	Error	95 Pct Conf Int for Mean
Grp 1	24	58.4687	44.2431	9.0311	39.7865	To	77.1510
Grp 2	24	42.2786	26.6920	5.4485	31.0076	To	53.5497
Grp 3	24	75.8304	24.8879	5.0802	65.3212	To	86.3396
Grp 4	24	71.3781	28.5038	5.8183	59.3420	To	83.4142
Grp 5	24	56.3092	34.4075	7.0234	41.7802	To	70.8383
Grp 6	24	21.4965	37.4524	7.6449	5.6817	To	37.3112
Grp 7	24	63.7234	38.7627	7.9124	47.3553	To	80.0914
Grp 8	24	28.5885	35.1398	7.1729	13.7503	To	43.4268
Total	192	52.2592	38.4191	2.7727	46.7902	To	57.7282

Group	Minimum	Maximum
Grp 1	.0000	100.0000
Grp 2	14.1801	100.0000
Grp 3	28.3780	100.0000

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

Group	Minimum	Maximum
Grp 4	21.3004	100.0000
Grp 5	7.9824	100.0000
Grp 6	.0000	100.0000
Grp 7	.0000	100.0000
Grp 8	.0000	100.0000
Total	.0000	100.0000

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

     Variable PRODUCT   PERCENT PRODUCTIVITY
  By Variable DISCIP   THERMAL DISCIPLINE

Multiple Range Test

LSD Procedure
Ranges for the .500 level -

     .96   .96   .96   .96   .96   .96   .96

The ranges above are table ranges.
The value actually compared with Mean(J)-Mean(I) is..
    24.2715 * Range * Sqrt(1/N(I) + 1/N(J))

(*) Denotes pairs of groups significantly different at the .500 level

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

    Variable PRODUCT   PERCENT PRODUCTIVITY
    (Continued)

```
                        G G G G G G G
                        r r r r r r r
                        p p p p p p p

   Mean      Group      6 8 2 5 1 7 4 3

  21.4965    Grp 6
  28.5885    Grp 8      *
  42.2786    Grp 2      * *
  56.3092    Grp 5      * * *
  58.4687    Grp 1      * * *
  63.7234    Grp 7      * * * *
  71.3781    Grp 4      * * * * * *
```

75.8304   Grp 3   * * * * * *

   Homogeneous Subsets   (Subsets of groups, whose highest and lowest means
                            do not differ by more than the shortest
                            significant range for a subset of that size)

SUBSET 1

Group   Grp 6
Mean   21.4965
- - - - - - - - - -

SUBSET 2

Group   Grp 8
Mean   28.5885
- - - - - - - - - -

SUBSET 3

Group   Grp 2
Mean   42.2786
- - - - - - - - - -

SUBSET 4

Group   Grp 5   Grp 1
Mean   56.3092   58.4687
- - - - - - - - - - - - - - - - - -

SUBSET 5

Group   Grp 1   Grp 7
Mean   58.4687   63.7234
- - - - - - - - - - - - - - - - - -

SUBSET 6

Group   Grp 4   Grp 3
Mean   71.3781   75.8304
- - - - - - - - - - - - - - -

This procedure was completed at 17:38:17
get file='c:\workrest\results.sys'.
The SPSS/PC+ system file is read from
     file c:\workrest\results.sys

This procedure was completed at 17:38:18
select if (dehyd eq 0 or dehyd eq 1).
select if (cloth eq 3).
oneway product by discip(1,8)/ranges=lsd(.5)/statistics=1.
The raw data or transformation pass is proceeding

192 cases are written to the uncompressed active file.

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

Variable   PRODUCT   PERCENT PRODUCTIVITY

By Variable DISCIP   THERMAL DISCIPLINE

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	7	33561.2966	4794.4709	3.5725	.0013
Within Groups	184	246938.7898	1342.0586		
Total	191	280500.0864			

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

Group	Count	Mean	Standard Deviation	Standard Error	95 Pct Conf Int for Mean		
Grp 1	24	43.2046	46.4911	9.4900	23.5731	To	62.8361
Grp 2	24	34.6356	31.7032	6.4714	21.2485	To	48.0226
Grp 3	24	62.9086	30.5360	6.2331	50.0143	To	75.8028
Grp 4	24	57.1023	33.5787	6.8542	42.9233	To	71.2813
Grp 5	24	41.0625	39.5293	8.0689	24.3708	To	57.7543
Grp 6	24	21.4740	37.4213	7.6386	5.6723	To	37.2756
Grp 7	24	32.3757	36.1060	7.3701	17.1294	To	47.6219
Grp 8	24	28.1811	35.2620	7.1978	13.2912	To	43.0709
Total	192	40.1180	38.3221	2.7657	34.6629	To	45.5732

Group	Minimum	Maximum
Grp 1	.0000	99.9900
Grp 2	.3993	99.9900
Grp 3	21.9402	99.9900

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

Group	Minimum	Maximum
Grp 4	12.5866	99.9900
Grp 5	1.6958	99.9900
Grp 6	.0000	99.9900
Grp 7	.0000	99.9900
Grp 8	.0000	99.9900
Total	.0000	99.9900

168

- - - - - - - - - O N E W A Y - - - - - - - - - - -

  Variable PRODUCT PERCENT PRODUCTIVITY
 By Variable DISCIP THERMAL DISCIPLINE

Multiple Range Test

LSD Procedure
Ranges for the .500 level -

    .96 .96 .96 .96 .96 .96 .96

The ranges above are table ranges.
The value actually compared with Mean(J)-Mean(I) is..
   25.9042 * Range * Sqrt(1/N(I) + 1/N(J))

(*) Denotes pairs of groups significantly different at the .500 level

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

  Variable PRODUCT PERCENT PRODUCTIVITY
  (Continued)

          G G G G G G G G
          r r r r r r r r
          p p p p p p p p

  Mean   Group 6 8 7 2 5 1 4 3

 21.4740 Grp 6
 28.1811 Grp 8
 32.3757 Grp 7 *
 34.6356 Grp 2 *
 41.0625 Grp 5 * * *
 43.2046 Grp 1 * * * *
 57.1023 Grp 4 * * * * * *
 62.9086 Grp 3 * * * * * *

 Homogeneous Subsets (Subsets of groups, whose highest and lowest means
           do not differ by more than the shortest
           significant range for a subset of that size)

SUBSET 1

Group   Grp 6   Grp 8
Mean   21.4740   28.1811
- - - - - - - - - - - - - - - - - - - -

SUBSET 2

Group	Grp 8	Grp 7	Grp 2
Mean	28.1811	32.3757	34.6356

- - - - - - - - - - - - - - - - - - -

SUBSET 3

Group	Grp 2	Grp 5
Mean	34.6356	41.0625

- - - - - - - - - - - - - - -

SUBSET 4

Group	Grp 5	Grp 1
Mean	41.0625	43.2046

- - - - - - - - - - - - - - - - -

SUBSET 5

Group	Grp 4	Grp 3
Mean	57.1023	62.9086

- - - - - - - - - - - - - - -

This procedure was completed at 17:38:27
get file='c:\workrest\results.sys'.
The SPSS/PC+ system file is read from
      file c:\workrest\results.sys

This procedure was completed at 17:38:28
select if (dehyd eq 3 or dehyd eq 4).
select if (cloth eq 1).
oneway product by discip(1,8)/ranges=lsd(.5)/statistics=1.
The raw data or transformation pass is proceeding
      192 cases are written to the uncompressed active file.

- - - - - - - - - - - O N E W A Y - - - - - - - - - - -

        Variable PRODUCT   PERCENT PRODUCTIVITY

      By Variable DISCIP   THERMAL DISCIPLINE

                              Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	7	24001.8317	3428.8331	2.3620	.0247
Within Groups	184	267104.8119	1451.6566		
Total	191	291106.6437			

170

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

Group	Count	Mean	Standard Deviation	Standard Error	95 Pct Conf Int for Mean		
Grp 1	24	48.1958	42.4793	8.6711	30.2584	To	66.1333
Grp 2	24	43.7464	36.6481	7.4808	28.2712	To	59.2215
Grp 3	24	60.6127	30.7067	6.2680	47.6464	To	73.5790
Grp 4	24	46.7164	37.1739	7.5881	31.0192	To	62.4135
Grp 5	24	17.8780	37.4175	7.6378	2.0780	To	33.6781
Grp 6	24	47.2859	37.9423	7.7449	31.2642	To	63.3075
Grp 7	24	46.1932	41.1660	8.4030	28.8103	To	63.5761
Grp 8	24	45.9132	40.0818	8.1817	28.9881	To	62.8383
Total	192	44.5677	39.0400	2.8175	39.0103	To	50.1250

Group	Minimum	Maximum
Grp 1	.0000	99.7200
Grp 2	.0300	99.7200
Grp 3	19.3968	99.7200

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

Group	Minimum	Maximum
Grp 4	7.7480	99.7200
Grp 5	.0000	99.7200
Grp 6	3.6138	99.7200
Grp 7	.0000	99.7200
Grp 8	.3828	99.7200
Total	.0000	99.7200

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

        Variable   PRODUCT   PERCENT PRODUCTIVITY
     By Variable   DISCIP   THERMAL DISCIPLINE

Multiple Range Test

LSD Procedure
Ranges for the   .500 level -

          .96   .96   .96   .96   .96   .96   .96

The ranges above are table ranges.
The value actually compared with Mean(J)-Mean(I) is..
      26.9412 * Range * Sqrt(1/N(I) + 1/N(J))

171

(*) Denotes pairs of groups significantly different at the .500 level

---

- - - - - - - - - - O N E W A Y - - - - - - - - - -

    Variable PRODUCT   PERCENT PRODUCTIVITY
    (Continued)

                  G G G G G G G G
                  r r r r r r r r
                  p p p p p p p p

    Mean   Group   5 2 8 7 4 6 1 3

    17.8780   Grp 5
    43.7464   Grp 2   *
    45.9132   Grp 8   *
    46.1932   Grp 7   *
    46.7164   Grp 4   *
    47.2859   Grp 6   *
    48.1958   Grp 1   *
    60.6127   Grp 3   * * * * * * *

    Homogeneous Subsets   (Subsets of groups, whose highest and lowest means
                           do not differ by more than the shortest
                           significant range for a subset of that size)

SUBSET 1

Group   Grp 5
Mean   17.8780
- - - - - - - - - -

SUBSET 2

Group   Grp 2   Grp 8   Grp 7   Grp 4   Grp 6
Mean   43.7464   45.9132   46.1932   46.7164   47.2859

Group   Grp 1
Mean   48.1958
- -

SUBSET 3

Group   Grp 3
Mean   60.6127
- - - - - - - - - -

This procedure was completed at 17:38:38
get file='c:\workrest\results.sys'.

The SPSS/PC+ system file is read from
    file c:\workrest\results.sys

This procedure was completed at 17:38:38
select if (dehyd eq 3 or dehyd eq 4).
select if (cloth eq 2).
oneway product by discip(1,8)/ranges=lsd(.5)/statistics=1.
The raw data or transformation pass is proceeding
    192 cases are written to the uncompressed active file.

            - - - - - - - - - - O N E W A Y - - - - - - - - - -

    Variable   PRODUCT   PERCENT PRODUCTIVITY

  By Variable DISCIP   THERMAL DISCIPLINE

                            Analysis of Variance

                              Sum of   Mean   F   F
        Source   D.F.   Squares   Squares   Ratio   Prob.

Between Groups   7   21799.4597   3114.2085   2.1881   .0372

Within Groups   184   261874.1475   1423.2291

Total   191   283673.6073

            - - - - - - - - - - O N E W A Y - - - - - - - - - -

                                Standard   Standard
Group   Count   Mean   Deviation   Error   95 Pct Conf Int for Mean

Grp 1   24   38.4821   44.1486   9.0118   19.8398   To   57.1244
Grp 2   24   32.8798   31.5108   6.4321   19.5740   To   46.1856
Grp 3   24   51.5846   34.2302   6.9872   37.1304   To   66.0387
Grp 4   24   35.5060   38.4385   7.8462   19.2748   To   51.7371
Grp 5   24   16.4433   37.5605   7.6670   .5829   To   32.3037
Grp 6   24   21.1665   36.9475   7.5419   5.5649   To   36.7680
Grp 7   24   41.8025   42.2828   8.6309   23.9480   To   59.6570
Grp 8   24   27.0798   35.0832   7.1613   12.2655   To   41.8941

Total   192   33.1181   38.5383   2.7813   27.6321   To   38.6040

Group   Minimum   Maximum

Grp 1   .0000   99.4100
Grp 2   2.1516   99.4100
Grp 3   12.9648   99.4100

            - - - - - - - - - - O N E W A Y - - - - - - - - - -

Group	Minimum	Maximum
Grp 4	1.9378	99.4100
Grp 5	.0000	99.4100
Grp 6	.0000	99.4100
Grp 7	.0000	99.4100
Grp 8	.0000	99.4100
Total	.0000	99.4100

- - - - - - - - - - - O N E W A Y - - - - - - - - - - -

    Variable PRODUCT   PERCENT PRODUCTIVITY
  By Variable DISCIP   THERMAL DISCIPLINE

Multiple Range Test

LSD Procedure
Ranges for the .500 level -

       .96   .96   .96   .96   .96   .96   .96

The ranges above are table ranges.
The value actually compared with Mean(J)-Mean(I) is..
    26.6761 * Range * Sqrt(1/N(I) + 1/N(J))

(*) Denotes pairs of groups significantly different at the .500 level

- - - - - - - - - - - O N E W A Y - - - - - - - - - - -

    Variable PRODUCT   PERCENT PRODUCTIVITY
    (Continued)

                           G G G G G G G G
                           r r r r r r r r
                           p p p p p p p p.

  Mean   Group   5 6 8 2 4 1 7 3

  16.4433   Grp 5
  21.1665   Grp 6
  27.0798   Grp 8   *
  32.8798   Grp 2   * *
  35.5060   Grp 4   * * *
  38.4821   Grp 1   * * *
  41.8025   Grp 7   * * * *
  51.5846   Grp 3   * * * * * * *

  Homogeneous Subsets   (Subsets of groups, whose highest and lowest means

do not differ by more than the shortest
significant range for a subset of that size)

SUBSET 1

Group   Grp 5   Grp 6
Mean   16.4433   21.1665
- - - - - - - - - - - - - - - - - -

SUBSET 2

Group   Grp 6   Grp 8
Mean   21.1665   27.0798
- - - - - - - - - - - - - - - - - -

SUBSET 3

Group   Grp 8   Grp 2
Mean   27.0798   32.8798
- - - - - - - - - - - - - - -

Page 137   SPSS/PC+   10/12/90

SUBSET 4

Group   Grp 2   Grp 4   Grp 1
Mean   32.8798   35.5060   38.4821
- -

SUBSET 5

Group   Grp 4   Grp 1   Grp 7
Mean   35.5060   38.4821   41.8025
- -

SUBSET 6

Group   Grp 3
Mean   51.5846
- - - - - - - - - -

Page 138   SPSS/PC+   10/12/90

This procedure was completed at 17:38:48
get file='c:\workrest\results.sys'.
The SPSS/PC+ system file is read from
     file c:\workrest\results.sys

Page 139   SPSS/PC+   10/12/90

This procedure was completed at 17:38:49
select if (dehyd eq 3 or dehyd eq 4).
select if (cloth eq 3).
oneway product by discip(1,8)/ranges=lsd(.5)/statistics=1.
The raw data or transformation pass is proceeding
     192 cases are written to the uncompressed active file.

Page 140   SPSS/PC+   10/12/90

- - - - - - - - - - - O N E W A Y - - - - - - - - - - -

175

Variable PRODUCT   PERCENT PRODUCTIVITY

By Variable DISCIP   THERMAL DISCIPLINE

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	7	9882.6165	1411.8024	1.0715	.3835
Within Groups	184	242431.5456	1317.5627		
Total	191	252314.1622			

Page 141   SPSS/PC+   10/12/90

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

Group	Count	Mean	Standard Deviation	Standard Error	95 Pct Conf Int for Mean		
Grp 1	24	30.3721	42.5716	8.6899	12.3957	To	48.3485
Grp 2	24	24.2996	34.0590	6.9523	9.9177	To	38.6815
Grp 3	24	40.4274	35.7378	7.2949	25.3367	To	55.5182
Grp 4	24	18.8954	35.3335	7.2124	3.9753	To	33.8154
Grp 5	24	15.8317	36.1727	7.3837	.5573	To	31.1061
Grp 6	24	20.2530	35.5604	7.2587	5.2371	To	35.2688
Grp 7	24	24.5314	35.7615	7.2998	9.4306	To	39.6321
Grp 8	24	24.2998	34.5051	7.0433	9.7296	To	38.8700
Total	192	24.8638	36.3458	2.6230	19.6900	To	30.0376

Group	Minimum	Maximum
Grp 1	.0000	97.2900
Grp 2	.0066	97.2900
Grp 3	7.3215	97.2900

Page 142   SPSS/PC+   10/12/90

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

Group	Minimum	Maximum
Grp 4	.0000	97.2900
Grp 5	.0000	97.2900
Grp 6	.0000	97.2900
Grp 7	.0000	97.2900
Grp 8	.0000	97.2900
Total	.0000	97.2900

Page 143   SPSS/PC+   10/12/90

- - - - - - - - - - O N E W A Y - - - - - - - - - - -

Variable PRODUCT   PERCENT PRODUCTIVITY

176

Multiple Range Test

LSD Procedure
Ranges for the   .500 level -

        .96   .96   .96   .96   .96   .96   .96

The ranges above are table ranges.
The value actually compared with Mean(J)-Mean(I) is..
     25.6667 * Range * Sqrt(1/N(I) + 1/N(J))

(*) Denotes pairs of groups significantly different at the   .500 level

---

- - - - - - - - - - O N E W A Y - - - - - - - - - - - -

     Variable PRODUCT   PERCENT PRODUCTIVITY
     (Continued)

```
                         G G G G G G G
                         r r r r r r r
                         p p p p p p p
   Mean      Group       5 4 6 2 8 7 1 3

  15.8317    Grp 5
  18.8954    Grp 4
  20.2530    Grp 6
  24.2996    Grp 2       *
  24.2998    Grp 8       *
  24.5314    Grp 7       *
  30.3721    Grp 1       * * *
  40.4274    Grp 3       * * * * * * *
```

  Homogeneous Subsets   (Subsets of groups, whose highest and lowest means
                         do not differ by more than the shortest
                         significant range for a subset of that size)

SUBSET   1

Group   Grp 5   Grp 4   Grp 6
Mean   15.8317   18.8954   20.2530
- -

SUBSET   2

Group   Grp 4   Grp 6   Grp 2   Grp 8   Grp 7
Mean   18.8954   20.2530   24.2996   24.2998   24.5314
- -

SUBSET 3

Group	Grp 2	Grp 8	Grp 7	Grp 1
Mean	24.2996	24.2998	24.5314	30.3721

- -

SUBSET 4

Group	Grp 3
Mean	40.4274

- - - - - - - - - -